# QUALITY OF NAPS IN INFANTS ACROSS HOME AND EARLY CHILDHOOD EDUCATION CENTRE SETTINGS

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## ABSTRACT

Limited research has been done on naps, particularly in early childhood education centres (ECECs). The present study followed a study by Torok (2009) with sleep-disturbed infants in ECECs. The objective of the current study was to examine the quality of naps in infants described as "typical sleepers" across two settings: the home and the early childhood education centre (ECEC). Two males and two females, ranging in age from 15- to 17-months contributed to four case studies. These were: i) an infant transitioning to the ECEC; ii) and iii) infants described as "settled" in an ECEC; and iv) an infant reported to have sleeping difficulties at home after the occurrence of a major earthquake. Observations from digital recordings were coded to determine sleep states and patterns. The findings across each case study were: i) naps varied in both settings during the infant's transition to an ECEC but settled in both settings once the infant was "settled" at the ECEC; ii) naps tended to be consistent across both settings in the "typical sleepers" who were settled at the ECEC; and iii) naps at home were varied in the infant reported to have reacted to the earthquake while her naps at the ECEC were consistent. Overall findings suggested that total nap periods tended to be longer at home, sleep efficiency tended to be higher at the ECEC, and that participants tended to engage in more active sleep than quiet sleep. Caregiver presence was a major difference between the home and ECEC setting. This study demonstrated differences and similarities across both settings with infants described as "typical sleepers". This is an important area due to the increasing number of infants attending ECECs (Statistics NZ, 2010). Several directions for future research have been presented.

# CHAPTER 1

# LITERATURE REVIEW

Sleep plays a major role in every individual's life as it contributes to aspects as wide ranging as their mood, behaviour, concentration, and emotion regulation (Muzet, 2007). However sleep is particularly crucial for physical, emotional, and cognitive development during infancy and childhood (Siren-Tiusanen & Robinson, 2001). The number of young children in New Zealand attending early childhood education centres (ECECs) has increased by 65% from 1997 to 2009 (Ministry of Education, 2010). This suggests that it is important to investigate and begin to understand how infants sleep at ECECs, as there have been concerns raised, for example around attachment, and there is a general understanding of transition as a stressor for infants (Kamerman & Kahn, 1995), and it may therefore have effects on infant sleep, particularly at ECECs.

There is a limited amount of research on naps, or day sleeps, in infants, even though naps play an important role in the developmental processes of infants, including the areas of emotional, cognitive and physical development (Siren-Tiusanen & Robinson, 2001). There is also a lack of literature around the area of naps in ECECs, even though the number of infants (under the age of 2) attending ECECs is increasing, meaning that increasing numbers of naps are occurring in this setting. The New Zealand Childcare Survey (Statistics NZ, 2010) found that over half of children aged 0-6 years attend some form of formal early childhood education (ECE), and more specifically that 52.7% of two-year-old infants and 45.6% of one-year-old infants attend ECECs, with the median time spent there being 18 hours per week. This indicates that there are a large number of infants who are spending time in ECE settings, with some spending considerable amounts of time there. Therefore, given the importance of

sleep in children's development, it is important to look at the quality of sleep that infants receive when at ECECs as it is possible that the quality of naps may vary between the ECEC and the home.

There are a number of important areas that need to be considered and the following will be addressed and reviewed in this literature review. It is important to understand the sleep organisation and architecture of infants, including the processes of sleep regulation and self-soothing in infants. Quality sleep will be described and the development of sleep will be discussed. The environmental factors that can influence sleep with be looked at, and the importance of sleep for infants will be emphasised. Naps in infants will then be considered specifically, followed by a section exploring sleep and ECECs. Concerns that are often associated with infants attending ECE include the area of attachment and care, and this will also be discussed.

The definition of infancy used in this research was between the ages of 6- and 24-months and was based upon the work of France (1989). The higher limit was set as once infants reach the age of two years their sleep organisation is more similar to that of older children or adults (Anders, 1980). They also generally have language, meaning that practices around sleep can be explained and negotiated between the parents/caregivers and the infant, rather than imposed on the infant. The lower limit of 6-months was used as it was expected, from a developmental point of view, that by this age most infants are able to sleep through the night (Henderson, France, Owens & Blampied, 2010). This definition of infancy will be the general definition used here, unless alternative ages are otherwise stated in the literature review.

## Organisation and architecture of sleep in infants

There are two main phases in the architecture of sleep in infants: quiet sleep (QS), which is similar to non-rapid eye movement (NREM) that is demonstrated in older children and adults, and active sleep (AS), which is similar to rapid eye movement (REM) also demonstrated by older children and adults (Middlemiss, 2004). The term quiet sleep is used in infant sleep, and not in that of older children or adults, as infants follow a path of maturation and NREM is relatively undifferentiated during this time (Anders, Sadeh, & Appareddy, 1995). Quiet sleep is characterised by little or no movement, and it is likely that the infant is difficult to rouse from sleep, while AS is characterised by involuntary movements and the infant may be easily roused (Blampied & France, 1993; Middlemiss, 2004). The sleep of infants is referred to interchangeably through the literature as either AS or REM, and QS or NREM and although the terms AS and QS will be used predominantly in this study, where other literature refers to REM and NREM this will be followed in this review.

The architecture of infants' sleep differs from that of older children and adults as it has been found that infants have higher proportions of QS/REM than older children and adults, and that they have shorter cycles of QS/REM than older children and adults (Anders, 1980; Middlemiss, 2004). Anders (1980) found that infants have a tendency to awaken during QS/REM stages, and this is not often found in older children or adults. The sleep architecture of infants also differs from that of older children and adults in the length of time of the sleep cycle. From three months of age, infants' sleep cycles have duration of 50 minutes where they alternate between QS and AS, while sleep cycles of adults generally last around 90 minutes (Middlemiss, 2004). However, young children have been found to fully mature in terms of their sleep cycle around the age of three years, and at this point their sleep closely resembles that of an older child or adult (Middlemiss, 2004).

*Sleep regulation and self-soothing in infants*

Sleep regulation is a process that is driven by biological mechanisms and allows sleep to be regulated through a process of smooth transitions from wake to sleep (Scher, 2005a). This process of sleep regulation is important as it allows an individual to regulate their states of arousal (Burnham, Goodlin-Jones, Gaylor, & Anders, 2002). Sleep regulation in infants is often discussed using the term 'self-soothing' which describes an infant's ability to regulate their own states of arousal during each stage of sleep, and this has been identified as an important aspect of establishing quality sleep-wake patterns in infants (Burnham et al., 2002). An example of self-soothing is an infant going back to sleep without sustained overt evidence of distress, such as crying and/or calling out, and without requiring caregiver intervention after waking during the night.

Middlemiss (2004) found that newborns wake every three to four hours and require parental assistance, but at the age of 8-months infants tend to arouse every six to seven hours, with 60 to 70% of these infants able to self-soothe. At 12-months-old, 70% of infants have been found to sleep throughout the night without waking their parents, through the process of self-soothing (Gaylor, Goodlin-Jones, & Anders, 2001).

## The development of sleep in infants

The development of sleep in infants is a complex process. The development of sleep-wake patterns in infants involves mastering important developmental tasks, and is contributed to by biological, physiological, developmental, and psychosocial factors (Sadeh, Flint-Ofir, Tirosh, & Tikotzky, 2007).

Within the first year of life most infants are able to mature their sleep-wake cycles into a diurnal pattern, and this is called sleep consolidation (Acebo, Seifer, Aytur, & Carskadon, 1995). By the time infants are one-year of age, most infants are able to sleep through the night and have one or two day sleeps (Middlemiss, 2004; Torok, 2009). However, Sadeh et al. (2007) found that approximately 30% of infants at the age of one-year-old do not sleep consistently through the night and this can become a persisting problem for some infants and their parents.

During the first twelve months of life sleeping patterns develop rapidly. Three longitudinal studies have investigated aspects of infant sleep development over the first year of life. Two of the studies used sleep diaries and videosomnography, while one study used sleep diaries and actigraphy. Actigraphy and videosomnography are two techniques which are commonly used in sleep research. Videosomnography is a time-lapse video recording of sleep-wake patterns (Burnham et al., 2002), while actigraphy uses a device that looks like a wrist watch, and is often worn around the participant's ankle, and measures body motilities (Tikotzky & Sadeh, 2009).

Burnham et al. (2002) investigated the development of sleep-wake patterns and aspects of self-soothing across the first year of life. Data was collected from eighty infants and their parents five times during the first year using questionnaires and time-lapse video recording (Burnham et al., 2002). It was found that newborns sleep for 16-17 hours a day, and that this was separated into 3-4 hour periods during a 24-hour-period (Burnham et al., 2002). It was also found that by the age of twelve-months-old, infants do the majority of their sleep at night

time and these night sleeps lengthen, although the total amount of sleep per 24-hour-period was not found to reduce greatly (Burnham et al., 2002).

Research conducted by Tikotzky and Sadeh (2009) also assessed the development of sleep patterns in infants over the first twelve months, although actigraphy measures were used along with sleep diaries. Eighty-five mothers and their infants participated in this study and data was gathered three times during the year. It was found that by the age of six-months, an infants' longest consolidated sleep period had lengthened to around six hours and that at the end of the first year infants are typically having two naps a day, and are likely to be sleeping 14-15 hours per day (Tikotzky & Sadeh, 2009).

The development of sleep consolidation during night sleep was investigated by Henderson et al. (2010). Parents of seventy five infants participated in the study and completed sleep diaries six times a month over the year, and these diaries were checked for reliability through the use of videosomnography. It was found that the most rapid development of sleep consolidation occurs within the first four months, and that over 50% of infants at 4-months-old are able to sleep through the night (Henderson et al., 2010).

## What is quality sleep?

Sleep has been highlighted as a process that allows individuals to recuperate and reenergise by entering into a physiological state of unconsciousness (Muzet, 2007). However, there are a number of variables that contribute to infants receiving quality sleep and gaining the maximum benefit from their sleep.

Quality sleep has been referred to as sleep that is uninterrupted in terms of waking (Siren-Tiusanen & Robinson, 2001). For each individual occurrence of sleep, Ferber (1995) discussed that quality of sleep in infants is determined by the length, consistency, environment, appropriateness of timing of the sleep, and whether the infant's wake is induced. The timing of sleep has been identified as a particularly important aspect for quality sleep in infants (Daws, 1993). It has been suggested that overall quality sleep patterns involve a balance of the total sleep schedule, the total amount of sleep that a child has in a 24-hour-period, the naps, and the sleep consolidation (Weissbluth, 1989, as cited in Siren-Tiusanen & Robinson, 2001).

Ferber (1995) discussed the contribution that the environment in which sleep occurs can make to the quality of sleep. In terms of this present research there are a number of environmental differences between the two observed settings, and these factors could impact on the quality of sleep observed in each setting. Environmental factors and their impact on sleep in infants will be discussed in the following section.

## Environmental factors and sleep in infants

This dissertation asks whether the sleep of infants in ECECs is different from their sleep at home, and how sleep changes in response to the transition to an ECEC. Moving to an ECEC involves a number of environmental changes such as sleeping in a room with a number of other infants, interacting and engaging with other infants, and differing caregivers. There is evidence for the effect of environmental changes on sleep and these can either disrupt or support the sleep.

It has been reported that environmental factors can influence the sleep of an infant. Halpern, MacLean, and Baumeister (1995) suggested that sleep-wake states in infants can be influenced by factors including sound that is occurring in the environment, temperature in their sleeping environment, and the time at which they are put down to sleep. This is supported by Muzet (2007) who presented the idea that noise in the sleep environment disturbs sleep, as sleep is a physiological state which allows noise, even ambient noise, to be reacted to, even in an unconscious manner.

It has also been found through research based on time-diaries, that demographic variables including: the culture of the child, the variation of their attendance at their education facility, such as the length attended per day or the number of days attended per week, and their family functioning variables, such as parental warmth, are all associated with children's sleep behaviours (Adam, Snell, & Pendry, 2007). Although this research was conducted with children over the age of 5, Adam et al. (2007) considered that these findings may also impact on the sleep behaviours of infants.

It has been asserted by Sadeh, Mindell, Luedtke, and Wiegand (2009) that infants' sleep patterns may be influenced by parental behaviours and that these effects also appear to be transactional in that parent behaviour, in turn, may be affected by infant behaviour. Although there is a strong basis for these assertions it is not clear as to which way the influence occurs (Sadeh et al., 2009). Support for the assertion that infants' sleep patterns may be influenced by parental behaviours has been demonstrated by a number of studies.

Johnson and McMahon (2008) conducted research using surveys completed by parents and teachers of 110 young children with a mean age of 3.81 years and examined the interactions between children and their parents at bedtime, and sleep-related cognitions of the parents. It was found that parental factors played a major contributing role in the sleep of young children, and a strong relationship was found between young children's' sleep problems and parent-child interactions, particularly the interactions that occur at sleep time (Johnson & McMahon, 2008).

A study conducted in 2009 explored relationships between sleep ecology and sleep using a web-based questionnaire with a sample size of 5006 parents of infants aged from 0- to 36-months (Sadeh et al., 2009). This research found that reported alterations in parents' bedtime behaviours often leads to improvements in infants' sleep, and that the use of consistent and regular bedtime routines was a predictor of better sleep (Sadeh et al., 2009). These findings suggested that sleep ecology, particularly around parental bedtime behaviours and routines, can influence the sleep and sleep consolidation of infants. However these findings are limited as although there is a large sample size, the use of a questionnaire does not give specific information around the quality of infant sleep (Sadeh et al., 2009). This study also found that factors such as having the cot in the parents' room, breastfeeding or feeding the infant a bottle at night time, bringing the infant into the parents' bed, and irregular bedtimes, predicted the number of night wakings that occurred (Sadeh et al., 2009).

However, research has also been conducted to support the assertion that parental behaviours may be influenced by their infant's characteristics. Scher (2008) found that infant sleep-wake patterns are influenced through transactions of the infant's own characteristics and

characteristics in the caregiving environment. This finding was based on research using questionnaires and activity monitors to examine maternal separation anxiety in relation to regulation of infants' sleep (Scher, 2008). This research suggests that when beginning at an ECEC an infant has to adapt to a different caregiving environment and each infant may respond differently to this.

The literature discussed above points out that it is not clear as to which way the transaction between infants' sleep and parental behaviours occurs. This is important to consider in terms of caregiver interaction at the ECEC as caregiver interaction may differ across infants, and also from the interaction received at home.

## The importance of sleep for infants

Sleep plays an important role in the developmental processes that infants follow. Although the precise functions of sleep are not fully known, it is widely assumed that the primary role that sleep plays in most individuals lives is restorative, which refers to the ability to support the individual to return to their optimal functioning, and infants need to complete each AS and QS cycle to gain all possible restorative benefits from their sleep (Daws, 1993). This is of particular importance in infants who are beginning to attend ECECs as they are confronted with unknown situations and environments, and if they are tired, or not functioning optimally, then they may not be able to cope as best they can with the situations that they face.

There are numerous restorative benefits that can be achieved from sleep. When infants gain an optimal amount of sleep under optimal circumstances, sleep has been shown to increase an

infant's efficiency and learning capacity, along with restoring their energy and enabling the child to be better able to deal with tiredness (Daws, 1993). Siren-Tiusanen and Robinson (2001) discuss that optimal circumstances involve having a sleep environment where any environmental factors that can disrupt the sleep are eliminated. Each of the two stages of infant sleep have been described as having restorative features. Quiet sleep (QS) has been described as supporting the immune system and nurturing physical growth and maturation, while AS has been described as impacting on an infants' ability to focus their attention and on their ability to be able to adapt emotionally to the physical and social environment, along with being able to maintain an optimistic mood (Daws, 1993).

A number of developmental aspects also benefit from sleep. Sleep behaviours, including sleep timing, the quantity of sleep, and the consistency of sleep, have been shown to directly and immediately impact on the emotive, cognitive, and behavioural functioning of an infant (Adam et al., 2007). These sleep behaviours have also been demonstrated to influence emotional and physical health in the long term, such as poor sleep behaviours being linked to obesity in children and adolescents (Adam et al., 2007). Research conducted examining sleep-wake patterns in infants and their achievement on the Bayley Scales of Infant Development also found that sleep quality accounts for a small, yet significant amount, of cognitive achievement in infants (Scher, 2005b).

While discussing the importance of sleep for infants, it is necessary to highlight the impacts that sleep disturbance can have on infant sleep as the effects of sleep deprivation can impact on the quality of sleep that an infant obtains. Sleep disturbance was defined by France (1989) as "behaviours associated with sleep which have been designated a problem by their parents"

(p. 4) and often refers to a range of sleep concerns such as sleep-onset delay, night-waking, and bed refusal (Blampied & France, 1993; France & Hudson, 1990).

Sleep disturbance can have a negative impact on an infant's well-being, as sleep loss has been determined to be a form of stress (Mindell, 1993), and the result of sleep disturbances or sleep loss may be physiological and developmental concerns for an infant (Bates, Viken, Alexander, Beyers, & Stockton, 2002). It has been suggested that ongoing disturbances in sleep may result in sleep deprivation which often impacts upon the quality of life and daytime functioning of an individual (Muzet, 2007).

A number of studies have looked into sleep disturbance and how it impacts on infants and young children. Scher, Hall, Zaidman-Zait, and Weinberg (2010) conducted research examining associations between cortisol levels and night-time sleep characteristics, and explored how these related to aspects of temperament and behaviour in infants and young children aged 12-36 months who attended childcare facilities. They found that infants and young children who had more fragmented sleep had higher cortisol levels upon awakening, as compared with infants and young children who had more efficient sleep, and a correlation was found between elevated cortisol levels and teachers' ratings of internalising behaviours and negative emotionality (Scher et al., 2010). These findings suggest that awakening cortisol levels may indicate that disrupted sleep patterns may lead to physiological regulation difficulties in infants and young children (Scher et al., 2010).

## Naps

Naps are described as being an important aspect of sleep in infants and young children (Siren-Tiusanen & Robinson, 2001); however there is a limited amount of literature around the area of naps, or day sleeps, of infants and young children. Some research has looked at aspects of naps, and this will be discussed here.

The number of naps that infants or young children have varies. Weissbluth (1995) conducted research using a cohort of 172 infants and young children aged from 6-months-old to 7-years-old to explore nap patterns across ages. It was found that the number of naps and the length of naps were associated with age (Weissbluth, 1995). Well established sleep patterns of two naps per day in infants aged 9- to 12-months-old, and one nap per day in infants aged 15- to 24-months-old were also found (Weissbluth, 1995).

Research conducted by Sadeh et al. (2009) examined sleep patterns in the first three years of life and found that the amount of day sleep decreased over time, that the quality of naps was mainly determined by the maturation of the infant or young child, and that this differed from night sleep which was found to be mainly impacted on by ecological factors (Sadeh et al., 2009). It was also found that the number of naps and the time that each sleep takes was primarily predicted by the age of the child (Sadeh et al., 2009), which supports the findings reported by Weissbluth (1995) above.

It has been suggested that not enough emphasis is given to the importance of naps, their duration, and their schedules (Siren-Tiusanen & Robinson, 2001). Goodlin-Jones, Sitnick,

Tang, Liu, and Anders (2008) suggested that nap deprivation, particularly if it is continued, can lead to an accumulation of significant sleep deficits, and if infants do not gain adequate levels of sleep per day their development and daily functioning can be compromised. At some point during young childhood, naps are eliminated from the child's sleep routines and this can be initiated by the parent or done spontaneously by the child (Weissbluth, 1995).The elimination of naps has been described as a vulnerable area in assisting infants and young children in their optimal development. According to Ferber (1995) the elimination of naps in young children aged 30-36 months can lead the child to becoming overtired and physically stressed. Weissbluth (1995) found that 65% of participants in their study spontaneously stopped their naps, while 33% of participants had their naps eliminated by their parents.

## Sleep and the early childhood education centre

There is also a lack of literature around naps that occur in the ECEC, which is becoming increasingly important due to the increasing number of infants and young children attending ECECs (Statistics NZ, 2010). However three studies have addressed aspects of naps specifically in ECEC settings. Two of the studies used quantitative measures, while one of the studies used a qualitative method. The two quantitative studies examined sleep patterns across two settings, while the qualitative study described sleep-wake patterns and nap times.

Ward, Gay, Anders, Alkon, and Lee (2008) examined naps and night time sleep-wake patterns in children aged 3- to 5-years who attended full time childcare centres. The research was conducted at two university-affiliated centres and used ankle actigraphy and sleep diaries to obtain sleep data (Ward et al., 2008). It was found that the average nap duration in this study was 75.8 minutes, and that the majority of children who were given the opportunity to

have a nap would take it (Ward et al., 2008). However, this research examined naps at the centre, and night sleep at home, which did not allow precise comparison between settings.

The research conducted by Torok (2009) examined the quality of napping sleep in the home and ECEC setting using digital video recordings and a coding system to acquire the data. The participants were three infants, aged between 6- and 30-months-old and were described as having sleep difficulties. It was found that the naps varied over both settings for each of the participants (Torok, 2009). Nonetheless, overall more napping time was spent in QS than AS, and the infants tended to have longer sleeps in the home setting compared to the ECEC setting (Torok, 2009). It was suggested that the overall difficulties with sleep in these children may have overshadowed the possible effects of differences between the two environments (Torok, 2009).

Nap schedules and sleep practices were examined based on data derived from naturalistic observations, sleep diaries, and interviews with parents and teachers across two Finnish day care centres (Siren-Tiusanen & Robinson, 2001). This research provided qualitative data across four infant-toddler groups and the four groups had different approaches to infant sleep. Two groups had a rigid approach in that the infants were put down at one time together, while another had an age-staggered approach, and one group followed individualised routines (Siren-Tiusanen & Robinson, 2001). In the groups where a rigid approach to naps was taken, it was suggested that this led to fragmentation within individual sleep rhythms, as the infants were often woken, interrupting their natural sleep patterns (Siren-Tiusanen & Robinson, 2001). Consequently, this was suggested to possibly impact on the infant's ability to complete each sleep cycle (Siren-Tiusanen & Robinson, 2001). The researchers concluded

that there were three particular differences in ECEC practices that can influence the quality of an infant's sleep and the physiological effectiveness of the sleep (Siren-Tiusanen & Robinson, 2001). These three differences were: i) whether naps were taken simultaneously with all age groups being put down at the same time, or if infants were put down at an age-appropriate and individual manner; ii) how well the staff at the ECEC and the parents/caregivers from home communicated with each other; and iii) the knowledge and awareness of the staff at the ECEC around the importance of sleep and the sleep environment (Siren-Tiusanen & Robinson, 2001).

Research has also been conducted based on young children who were attending ECECs, using sleep diaries completed by the children's' mothers and behaviour reports completed by teachers at the ECECs (Bates et al., 2002). The research findings indicated that children who presented with disrupted sleep schedules had more negative adjustment in ECECs (Bates et al., 2002). However, the sleep diaries used in this research limited the assumptions that could be interpreted, as the diaries failed to examine sleep behaviours by only recording what time the child was put down and when they were picked up. Consequently it was uncertain how much sleep the child actually had (Bates et al., 2002). It was also found that infants' ordinary variations in sleep before beginning attending an ECEC was related to how they adjusted upon beginning at the ECEC (Bates et al., 2002). Although this research does not focus on naps, it indicates that if an infant's sleep schedules are disrupted at home, then they are less likely to adapt without difficulty to an ECEC when transitioning.

## Attachment and care

There have been a number of concerns around attachment and care and when is an appropriate time for infants to begin to attending ECECs. Some research has been done to look into these issues and this will be further discussed here.

Much debate around attendance at ECECs has arisen based upon the works of Bowlby (1969; 1973; 1988) on attachment and separation, with attachment referring to an enduring emotional bond between a child and a significant caregiver (Carr, 2006). There are four attachment styles: secure, anxious-ambivalent, avoidant, and disorganised (Carr, 2006). Secure attachment has been described as the optimal style of attachment, leading children and their caregivers to appropriately and sensitively respond to each other (Scher, 2001). This allows the child to be provided with a 'safe base' in their caregiver which allows them to be able to explore environments but to be comforted when distressed, while the other three styles are all described as forms of insecure attachments (Carr, 2006).

Roggman, Langlois, Hubbs-Tait, and Rieser-Danner (1994) interpreted Bowlby's attachment theory as meaning that the repeated separations of mothers and infants for attendance at day-care are disruptive to the caregiving interactions needed for the formation of secure attachments. They conducted research with one hundred and five 12-month-old infants and evaluated their attachment classification through Strange Situation assessments (Roggman et al., 1994). They found that the experience an infant has at day-care was significantly related to insecure attachments, and that there were more negative attachment outcomes associated with little or part time spent at day-care, rather than infants who attended day care full time (Roggman et al., 1994).

There has been a considerable amount of research exploring aspects of attachment and ECE, including that of Roggman et al. (1994) above. Belsky and Rovine (1988) conducted research by combining the results of two longitudinal studies on infant and family development, and they analysed data based on Strange Situation assessments completed at the age of 12- and 13-months-old. It was found that infants who attended a day-care facility for more than 20 hours per week were more likely to be classified more insecurely attached to their mothers than infants who spent less than 20 hours in day-care per week (Belsky & Rovine, 1988). This contrasts with the findings of Roggman et al. (1994) above, which demonstrates that this is an interesting area with multiple varying factors that need to be accounted for, and highlights the need for more research in this area.

Research by Scher (2001) explored infants' sleep patterns from the perspective of mother-child attachment. Infants who were securely attached were compared with infants who were insecurely attached, as it was suggested that the reactions around separation at sleep time and the infants' responses could be related back to the attachment between the infant and caregiver due to the anxiety the situation may induce (Scher, 2001). However, in a sample of children who were described as 'non-risk', it was found that there was only a marginal association between the sleep characteristics and the infant's attachment relationship with their caregiver (Scher, 2001). This suggests that the attachment between an infant and their parent or caregiver may have some significance in terms of napping at an ECEC, but that it is unlikely to have a major influence as an infant transitions to an ECEC.

Ahnert, Gunnar, Lamb, and Barthel (2004) conducted research examining infants' transitions to childcare, and how it was associated with infant-mother attachment. The

attachment between infants and mothers was assessed as the infants began attending childcare centres, and salivary cortisol levels were measured (Ahnert et al., 2004). The sample included seventy infants who were aged 15-months-old, and the infants were assessed at home before beginning at the childcare centre, during the adaptation and separation stages, and followed up five months later (Ahnert, et al., 2004). It was found that infants who were securely attached, as compared with the infants that were insecurely attached, before beginning at the centre had significantly lower levels of cortisol during the adaptation phase and this was found to be correlated with a higher fuss and cry level during the separation phase (Ahnert, et al., 2004). It was also found that the infants who were securely attached before attending the centre remained securely attached at follow up, and that if the mothers of the infants who were insecurely attached before attending the centre spent more time settling the infant during the adaptation phase then it was more likely that the relationship would become securely attached (Ahnert et al., 2004).

## Summary

Overall, all of the literature based around sleep supports the necessity and importance of sleep in every individual's life, but particularly during infancy and childhood. This literature review highlighted a lack of literature around the area of naps in infants, particularly infants who are described as typical sleepers, which suggests that more research is needed in this area. It also highlighted a lack of data based around naps in ECECs which further suggests that this is another area that would benefit from further research, especially due to the large number of infants who attend some form of ECE (Statistics NZ, 2010).

The literature has also indicated that the role of attachment in an infant's transition to an ECEC is unclear and may or may not have explanatory value in understanding infants' reactions to this stressor. The current research aims to describe rather than explain the effects of the ECEC setting on sleep by comparing sleep in home and ECEC settings.

## Aims of the Original Study

This research intended to recruit infants between the ages of 6- and 24-months-old who were about to begin attending an ECEC and who were described as typical sleepers, in that they did not have difficulty being put down to sleep, or continually wake during sleep. Sleep data was to be collected, utilising a multiple-baseline across participants design, before the participating infants began attending the ECEC; during their transition period at the ECEC; and when the infants were settled in the ECEC. The aim of the original study was to use the quality of the participating infants' naps in the two environments to examine whether the transition period to ECEC impacts on the quality of the naps of participants in the two environments.

However, this was not possible due to two major delays outside of the researcher's control. Staff changes within the university-affiliated ECECs led to a delay in consent to begin the research. A further delay resulted from the Christchurch earthquake (4$^{th}$ September, 2010) and subsequent aftershocks, which caused the ECEC to close for a time and disrupted individuals' sleep and lives. In addition to causing further delays, the impact of the earthquake would have meant that a meaningful interpretation of changes in infant sleep on transitioning could not have been made. They were not transitioning under normal conditions.

Consequently, a case-study design across-settings had to be used. It was decided by the researcher, in conjunction with the director of the ECEC and her supervisors, that the study would be amended to collect transitioning data where possible, but to supplement this with data from infants who were already settled at the ECEC. Torok (2009), who examined the sleep of children with reported sleep difficulties across the home and the ECEC, indicated that it would be beneficial for research to look at the naps of typical sleepers across these settings to attempt to understand naps in these settings.

## Aims of the Current Study

The amended objective of the current study was to examine the quality of naps in infants who were described as being "typical sleepers" by their parents across two settings – the home and the ECEC. Four case studies were conducted with one child transitioning to the ECEC, two infants who were already settled at the ECEC, and one infant who was reported to be having difficulty sleeping at home since the occurrence of a major earthquake and was reported to be sleeping well in the ECEC. Specific aims for each case study are described in the respective chapters (Chapters 3-6).

# CHAPTER 2

# METHOD

## Design

This study used a case-study design across two settings. The settings were the home and a university-affiliated ECEC.

## Participants

Potential participants were approached by the director of the ECEC. The criteria for inclusion were that the infant was aged between 6- and 24-months-old; attending, or about to begin attending, an ECEC; and described by their parents as being "typical sleepers". Of the parents willing to participate in the research, only one infant was excluded, being younger than 6-months-old.

The participants were four infants, comprised of two females and two males. The participants were aged 15-months, 16-months, 16-months, and 17-months at the beginning of this study. Contextual information about the participating infants is displayed in Tables 4, 8, 12 and 16, and pseudonyms have been used for each of the participants. Two of these infants (Charlie and Seth) were already settled and attending the ECEC. One infant (Sophie) was about to begin transitioning to the ECEC during recruitment. An additional infant (Charlotte) was included in the study. Initially, the director suggested that she would meet the requirements for the study, however in an interview the mother reported that she had been having difficulty sleeping at home after the earthquake. It was decided to include Charlotte as a further case-study because her mother was keen to be involved.

## Settings

Two settings were used in this study. One was the ECEC that each of the participants attended, and the other setting was the home of each participant.

The ECEC was a unit specifically set up for infants under the age of two-years-old. The ECEC staff were fully qualified ECE teachers, along with casual staff who assisted the ECEC. The ECEC follows the primary caregiving model which attempts to alleviate uncertainty for infants at the ECEC by having a primary caregiver assigned to each infant (Berhardt, 2000). The primary caregiver is responsible for the majority of their assigned infants' care at the ECEC (Berhardt, 2000).

The sleep room at the ECEC was specifically set up with six cots and room for mattresses on the floor. The room was away from play areas, darkened and well-ventilated. A teacher was always present in the room when there was an infant sleeping, and background music was occasionally played. Infants were put down at individually appropriate times.

The home environments of the participants had similarities and differences. Both Charlotte and Charlie shared a room with an older sibling, while Seth had his own room, and Sophie slept in her parent's room at night time. Charlotte, Charlie, and Seth were all put down for naps alone in their cots with the rooms being darkened, while Sophie was put to sleep in a buggy which was either put outside (weather permitting) or in a sunroom.

## Materials and Measures

The materials used in this study included a Sony Handycam video camera, with Super Night Shot (0 lux infrared light system), and was used in conjunction with a tripod to record each of the nap observations. These observations were transferred to a laptop, where each of the observations were viewed in real time and coded using a procedure developed by Anders (1980). This coding procedure allowed a sleep state to be assigned for each minute of the nap during the viewing of each observation. This coding procedure is outlined in Table 1, and has also been employed by other studies including Torok (2009), Henderson (2001), and France (1989).

Table 1.

*Coding procedure used to assign sleep states from nap observations.*

| Code (Infant) | State | Scoring |
|---|---|---|
| 7 | The infant is out of bed, cot, or location of sleep. | Any length of time the infant is out of bed/cot/nap location is scored. |
| 6 | The infant is crying. | Any length of time the infant is crying is scored. |
| 4 | The infant is awake. | Any length of time the infant is awake is scored. |
| 2 | The infant is in active sleep (AS). | AS is characterised by sudden involuntary body movements, such as twitching. When the infant is settling, any length of AS is recorded. Once settled, an infant must make 3 movements within 5 minutes for AS to be coded. Each sleep state must last for at least 5 minutes |
| 1 | The infant is in quiet sleep (QS). | Quiet sleep is characterised by an absence of body movement. An infant must make fewer than 3 movements every 5 minutes, and each sleep state must last at least 5 minutes. |
| **Code (Caregiver)** | **State** | **Scoring** |
| 2 | The caregiver is present with interaction. | Any length of time the caregiver touching or talking to the infant is scored. |
| 1 | The caregiver is present without any interaction. | Any length of time no interaction between infant and caregiver is scored. |
| 0 | The caregiver is absent. | Any length of time that the caregiver is absent is scored. |

*Sleep variables*

A number of sleep variables were examined in the raw data. Table 2 highlights these sleep variables, and are amended from the study of Torok (2009).

Table 2.
*Description of sleep variables.*

| Sleep variable | Description |
|---|---|
| Time down | The time that the infant is put down to sleep |
| Time up | The time that the infant is picked up after the sleep |
| Total nap period | Total length of time from time down to time up (including sleep and awake periods) |
| Length of nap sleep | Length of time spent asleep during total nap period |
| Time crying | Time spent crying during the total nap period |
| Sleep-onset latency | Time taken to get to sleep from time down |
| Time in active sleep | Time spent in active sleep during total nap period |
| Time in quiet sleep | Time spent in quiet sleep during total nap period |
| Time awake | Time spent awake during the total nap period (includes time crying and out of nap location) |
| Time out of nap location | Time spent out of the location where infant is put down to sleep (e.g. cot, buggy) |
| Sleep efficiency | Percentage of time spent asleep during total nap period, calculated using formula (length of nap sleep ÷ total nap period) x 100 |
| Caregiver absent | Total amount of time the caregiver is absent from the location where nap is occurring |
| Caregiver present only | Total time spent with caregiver present in the room where nap is occurring with no visual or auditory interaction from them with the infant |
| Caregiver present with interaction | Total time spent with caregiver present in the room and interacting with the infant |

NB: All times are in minutes, with the exception of sleep efficiency given as a percentage

*Settled at the ECEC*

Case Study 1 examined the nap architecture of an infant who was transitioning to the ECEC, and the definition of settled was discussed with the staff at the ECEC. The definition of settled at the ECEC was that the infant was not showing signs of distress or protest when her parent/caregiver left her at the ECEC, and when she was not crying or distressed during everyday activities at the ECEC.

## Data Coding

Each video observation was watched at real-time speed which allowed each movement to be noted, and changes in sleep states to be interpreted and recorded for each minute of the participant's nap using the coding system described above. The caregiver presence or interaction was also recorded during play back of the video observation which allowed this to be interpreted and coded using the caregiver coding technique (see above).

## Inter-Rater Reliability

A second person also watched five of the 25 videos (20%) and noted down each movement made, along with noting down any time that the caregiver was present and any time interactions occurred between the caregiver and the infant. These five videos were randomly selected. This process was done to ensure reliability by using inter-rater reliability. The reliability indices are shown in Table 3. The inter-rater reliability gave a reliability index as a percentage and was computed using the following equation:

$$\text{Reliability index (\%)} = \frac{\text{Number of agreements}}{\text{Number of agreements + Number of disagreements}} \times 100$$

Table 3.

*Reliability index percentage for videos randomly selected for inter-rater reliability.*

| Video number | Reliability index (%) |
|---|---|
| Video 1 | 89 |
| Video 2 | 88 |
| Video 3 | 91 |
| Video 4 | 93 |
| Video 5 | 91 |
| Mean reliability index | 90.4% |

The mean inter-rater reliability index was found to be 90.4% and demonstrates a satisfactory level of reliability.

## Procedures

Once it was established that the infant met the inclusion criteria, the parents were given detailed information sheets (see Appendix A for information sheets) about the study and were given an opportunity to ask the researcher questions. Upon recruitment to the study, the researcher conducted an initial interview with a parent of the infant and arranged for them to complete a sleep diary of the infant's sleep patterns. After the initial interview, the parent gave informed consent and observation times were arranged (see Appendix B for consent forms).

For each of the participants, an observation was set up after the initial interview. The observation procedure was set up before the infant was placed into the cot, by placing the video camera and tripod in a position in the infant's nap location such that it allowed the majority of the cot/buggy to be seen. Once the equipment was set up, the parent was informed that the observation was ready to go. The researcher was contacted by a parent when the infant woke, and the equipment was picked up. It was ensured that each time the equipment was set up at home that it was a safe distance away from the infants to ensure that the infants did not harm themselves or the equipment.

For the two infants who were already settled and attending the ECEC (Charlie and Seth) and the infant who was having difficulty sleeping at home due to the earthquake (Charlotte) a total of three naps were recorded in the home. Charlie's parents opted to have the three home observations completed on three consecutive days, while Seth and Charlotte had one observation per week for three consecutive weeks and this was due to scheduling issues or ECEC attendance. The infant transitioning to the ECEC (Sophie) had four observations conducted at home, with one per week for three consecutive weeks, and the fourth home observation was conducted once she was settled at the ECEC. For each of the following observations, a time was arranged for the researcher to set up the equipment, and parents contacted the researcher once the infant was up, and the researcher would go and collect the equipment at an agreed upon time with the parents.

It was decided between the director and the researcher that observations at the ECEC would allow the equipment to be set up before the ECEC was open for infants to arrive, and the equipment was picked up at the end of the ECEC day. This was done to ensure that the

researcher did not enter the sleep room during the day as this may have disturbed or influenced an infant's sleep. The sleep room had a shelf beside a cot which allowed the camera to be put in a discreet position that would not interfere with the running of the sleep room or the sleep of the infants in the sleep room. The director was given instructions by the researcher on how to start and stop the recording of the nap, and the director would start the recording before the infant who was being observed was put down, and would stop it once the infant was picked up.

Dates for observations of each participant at the ECEC were agreed upon between the researcher and the director at the ECEC. For the two infants who were already attending the ECEC and were settled (Charlie and Seth), and for the infant who had reported sleep difficulties due to the earthquake (Charlotte), they each had three naps recorded at the ECEC with one observation being done per week for three consecutive weeks. For the infant who was transitioning to the ECEC (Sophie) three observations were conducted at the ECEC, with one per week for two consecutive weeks, and the third ECEC observation was conducted once she was settled at the ECEC. Where possible, the same days were used for each participant's observation each week, however due to sickness and scheduling, this was not always possible.

A time was also arranged to conduct an interview with each of the primary caregivers of each of the participating infants at the ECEC. These interviews were conducted at a point during the course of observations at the ECEC when it was convenient for the ECEC teachers.

## Ethics

Prior to beginning this research, ethical approval was obtained from the Human Ethics Committee, University of Canterbury, on the 28 June 2010 (see Appendix C for a copy of the approval letter). Following on from this, informed consent was gained from the parents of the participating infants, and also from the ECEC director and the teachers at the ECEC. The participants and both the director and the teachers at the ECEC were assured that they could decline or withdraw from taking part in this research at any stage without giving a reason, and this was further addressed in the information sheet and consent form.

# CHAPTER 3

# CASE STUDY 1: SOPHIE – TRANSITIONING TO THE EARLY CHILDHOOD EDUCATION CENTRE

Sophie was a 15-month-old female who was transitioning to the ECEC. Table 4 displays contextual information about Sophie and her sleep routines and environments. The aim for this case study was to examine how the quality of naps in both the home and ECEC settings changed from prior to attending the ECEC to once settled at the ECEC. Differences across both settings and time are of interest in that transition may have an effect on naps in both settings.

## METHOD SPECIFIC TO SOPHIE

### Design

This case study employed a replication design following an $ABA_1BA_1BA_1$ pattern, where

A = observation at home before beginning attending the ECEC, B = observations conducted at the ECEC, and $A_1$ = observations conducted at home once attending the ECEC.

Table 4.

*Participant information: Sophie*

| Name: | Sophie |
|---|---|
| Age: | 15-months |
| Gender: | Female |
| Family composition: | Sophie lived at home with her mother, father, and older brother (5-years-old). |
| Sleep history: | Sophie's mother described her as a good sleeper since birth, with no current concerns. |
| Home sleep environment: | Sophie was put down for a nap in a buggy which was put outside if the weather permitted, or a sunroom. For night-sleeps, Sophie was put down in a cot in her parents' room. |
| Naps at home: | Sophie had been having one nap per day at around 10am for 2-3 hours, and had been doing this for two weeks. Prior to this, she had been having one nap in the morning (around 9am) for around 2 hours, and another nap in the afternoon (around 2.30pm) for around 2 hours. A typical nap routine involved Sophie being breastfed before being put into the buggy. She was then pushed outside and rocked until settled. |
| Night-time sleep: | Sophie's night-time routine involved having dinner and a bath, followed by being dressed and breastfed. She was then put into her cot. Sophie's mother reported that Sophie woke around two times per night for breastfeeding. |
| ECEC attendance: | Once beginning at the ECEC, Sophie attended the ECEC Monday, Wednesday, Thursday, and Friday for full days. Sophie was observed at home on a Thursday (before attending ECEC), Friday, Friday, and Tuesday. |
| Development: | Sophie's mother and ECEC primary caregiver both report that they had no concerns around her development, and Sophie's mother described Sophie as a 'very happy little girl'. |

## Procedure

One observation was conducted at home prior to beginning at the ECEC. During Sophie's transitioning phase to the ECEC, one observation in each setting per week was conducted. Two observations were completed in each setting (the home and the ECEC) during the transition phase and these were done over two consecutive weeks. Once the ECEC reported that Sophie was settled in the ECEC, a further observation was conducted at the home and the

ECEC in the same week. The observations once Sophie was settled at the ECEC occurred three weeks after the last home observation had been conducted during the transitioning phase.

## RESULTS SPECIFIC TO SOPHIE

Sophie's data were analysed visually comparing Sophie's naps across the two settings and the measurement periods. Figure 1 displays Sophie's nap activity across the length of the naps, while the caregiver presence and interaction across the length of the naps is displayed in Figure 2. Tables 5 and 6 display Sophie's overall nap data aggregated nap-by-nap within each setting, and Table 7 includes means across all of Sophie's naps.

### Data Analysis

Figure 1 displays Sophie's naps in both the home and the ECEC in chronological order. Sophie slept during each nap period at home except for Nap 3, and slept during every nap in the ECEC.

*Graphical analysis across naps*

During Sophie's baseline nap at home (Nap 1, A) she was awake for a period of time (15 minutes) before falling asleep. Sophie engaged in AS for a considerable time (63 minutes) before transitioning to a brief period of QS (8 minutes). Sophie returned to AS for another considerable length (59 minutes) before transitioning to QS for a short time (6 minutes). Sophie engaged in AS for a time (15 minutes) before waking. Sophie was awake for three minutes before beginning to cry, and was then picked up.

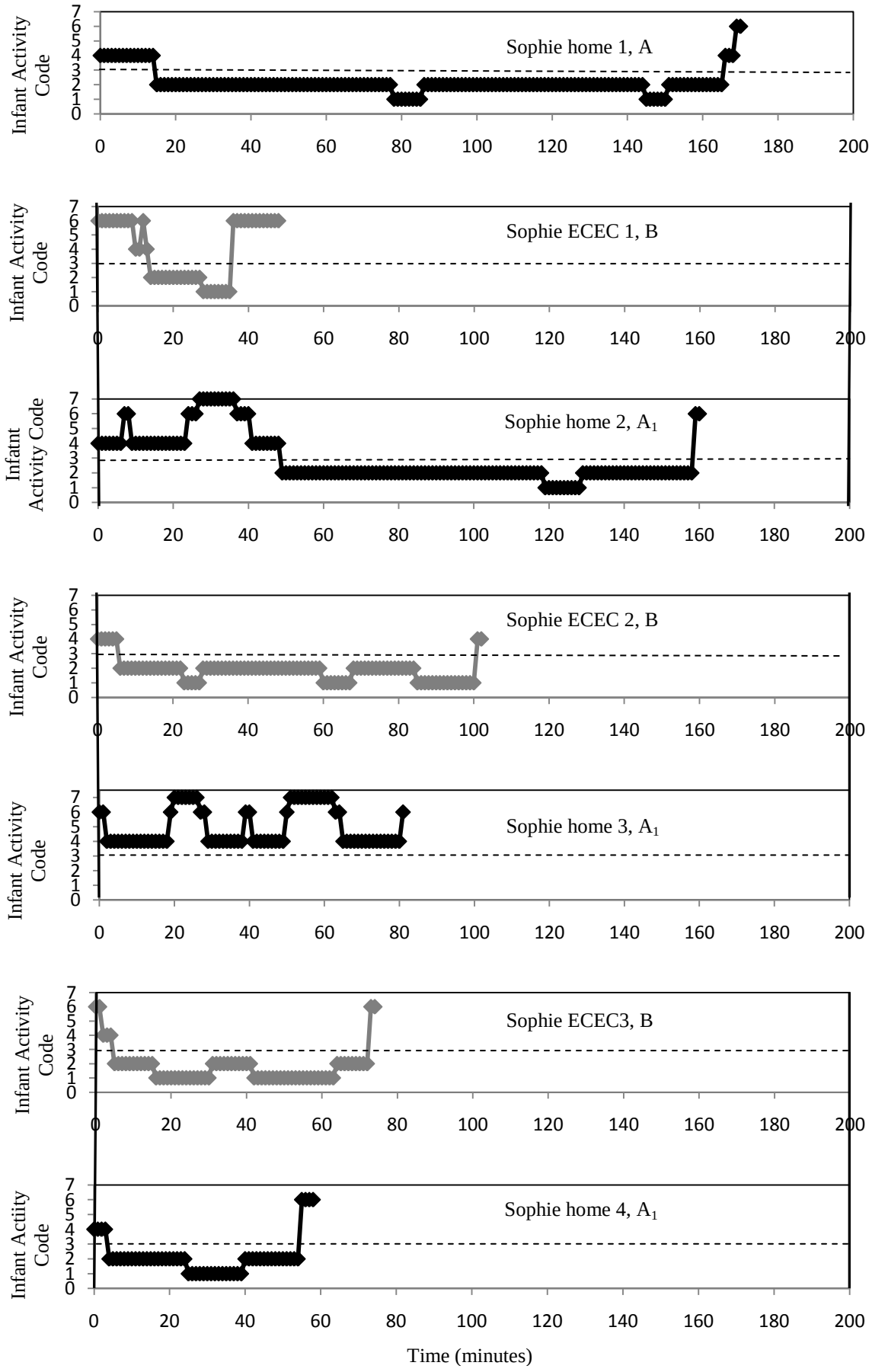


*Figure 1.* Sophie's naps at home and the ECEC in chronological order. Dotted line denotes demarcation between sleep (1, 2) and wake (4, 6, 7) codes.

Sophie's next four naps occurred over the transitioning period to the ECEC, with one nap in each setting taking place each week for two consecutive weeks. During Sophie's Nap 1 at the ECEC (B) she began crying as soon as she was put down and this continued for some time (11 minutes) with brief instances (2 minutes and 1 minute) where she did not cry before falling asleep. Sophie engaged in AS (14 minutes) before transitioning to QS (8 minutes). Sophie awoke from QS and began crying as soon as she woke which continued until she was picked up.

During Nap 2 at home ($A_1$) Sophie was awake for a period of time (24 minutes) and cried briefly during this time (2 minutes). Sophie began crying again and did so for a short time (3 minutes) before she was picked up. Sophie was put down again and cried briefly (4 minutes). Sophie was awake for a time (8 minutes) before falling asleep. Sophie engaged in a considerable length of AS (70 minutes) before transitioning to QS (10 minutes). She then transitioned again to AS (30 minutes) before waking. Sophie began crying as soon as she woke and cried briefly (2 minutes) before she was picked up.

Over the second week of transitioning, during Nap 2 at the ECEC (B) Sophie was awake for a brief time (6 minutes) before going to sleep. Sophie engaged in AS for a period (22 minutes) before transitioning to a brief period of QS (5 minutes). Sophie then engaged in AS again for a considerable time (32 minutes) and then transitioned to QS for a time (8 minutes). Sophie transitioned into AS for a time (17 minutes) before transitioning to QS (16 minutes), from which she woke. Sophie was awake for a brief time (2 minutes) before she was picked up.

Sophie did not engage in any sleep during the total nap period of Nap 3 at home ($A_1$). Sophie cried briefly (2 minutes) before spending a period of time awake (17 minutes). Sophie began to cry and was picked up for a period of time (7 minutes) before being put down again. Sophie cried briefly (2 minutes) before lying awake in the buggy for a time (10 minutes). Sophie briefly cried (2 minutes) before continuing to lie awake in the buggy for a time (9 minutes). Sophie began to cry again and was picked up for a period (12 minutes). Sophie was put down again and she cried briefly (2 minutes). Sophie lay awake for a time (16 minutes) before beginning to cry and was then picked up.

The settled observations occurred three weeks after the last observation had been done. During her settled observation at the ECEC, Nap 3 (B), Sophie cried briefly (2 minutes) when she was put down, followed by a brief period (3 minutes) of wake before falling asleep. Sophie engaged in a period of AS (11 minutes) before transitioning to QS (15 minutes). Sophie engaged in AS again for a time (11 minutes) before again transitioning to a considerable length of QS (22 minutes). Sophie engaged in a period of AS (9 minutes) before waking and crying briefly (2 minutes) before she was picked up.

The settled observation at home was Nap 4 ($A_1$). Sophie was put down and was awake for a brief period (4 minutes) before falling asleep. Sophie engaged in a period of AS (21 minutes) before transitioning to a length of QS (15 minutes). Sophie engaged in a period of AS (15 minutes) before waking and crying briefly (4 minutes) before she was picked up.

Figure 2 displays Sophie's caregiver presence and interactions during each of the naps across both settings in chronological order. Sophie slept during each nap period except for Nap 3 ($A_1$) at home.

During Sophie's baseline nap at home (Nap 1, A) she received caregiver interaction for a period (17 minutes) before the caregiver left briefly (3 minutes), returning and interacting momentarily (1 minute) before leaving again for the majority of the nap (153 minutes). The caregiver then returned and interacted with Sophie, and picked her up (1 minute).

During Nap 1 at the ECEC (B) Sophie received caregiver interaction for a period of time (13 minutes) before the caregiver stopped interacting but remained present in the room (22 minutes). Interaction occurred towards the end of the nap for the same length as the initial interaction (13 minutes).

Sophie received caregiver interaction for a period (22 minutes) once put down for Nap 2 at home (A1). The caregiver left momentarily (1 minute) before returning and continuing interaction briefly (4 minutes) before getting Sophie out of the buggy for a time (10 minutes). After Sophie was returned to the buggy, interaction occurred for a period (15 minutes) before the caregiver left for a considerable length of time (108 minutes). The caregiver returned and interacted momentarily (1 minute) and picked Sophie up.

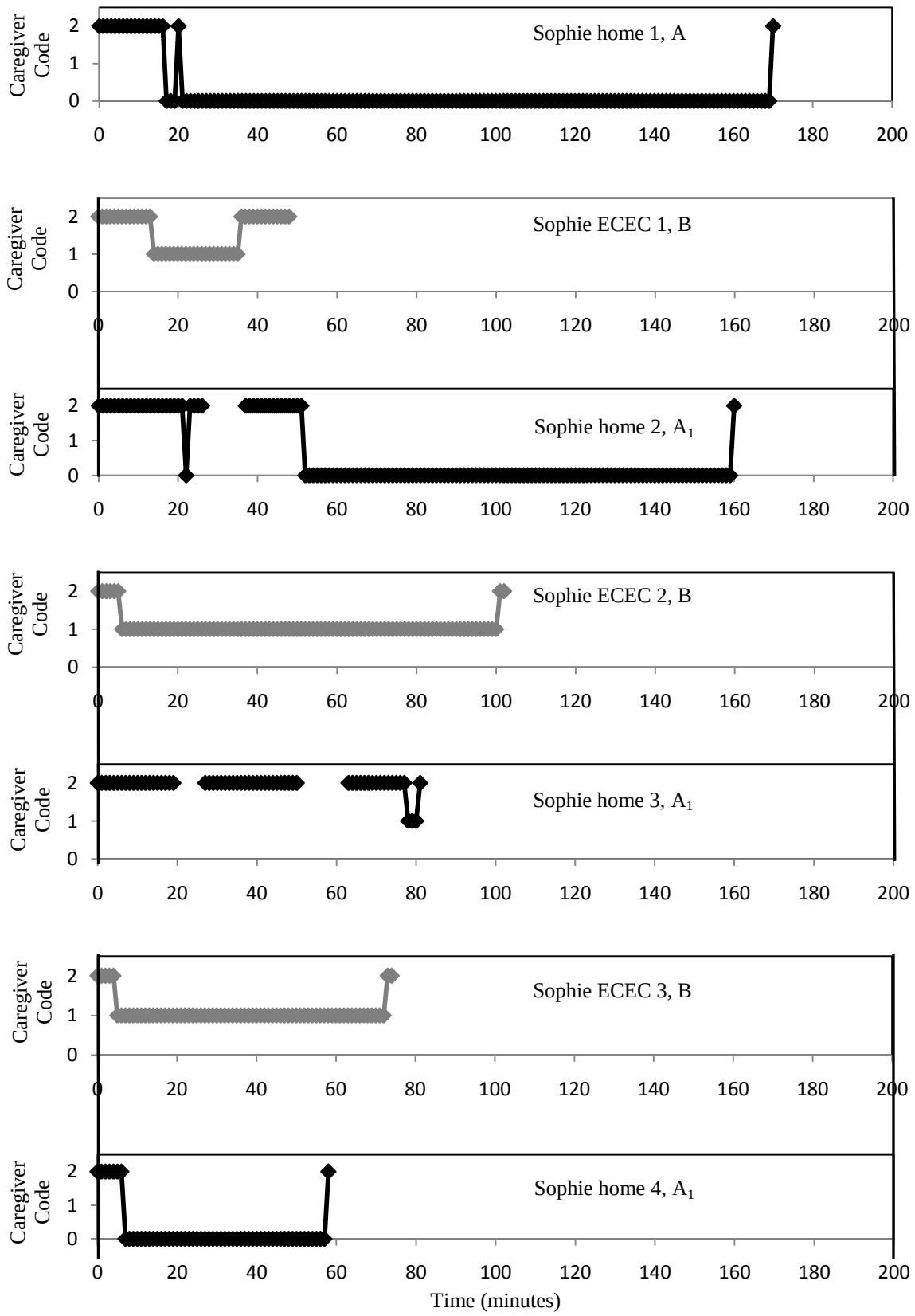


*Figure 2.* Caregiver presence and interactions during Sophie's naps at home and the ECEC in chronological order. Note that absent data points occurred out of view of the observation.

During Nap 3 at home, the caregiver interacted with Sophie for a period (20 minutes) before getting her out of the buggy for a time (7 minutes). The caregiver continued to interact with Sophie after putting her down and did so for a period (24 minutes) before getting her up again for a time (12 minutes). Sophie was put down again and the caregiver interacted with her for a period (15 minutes) before leaving briefly (2 minutes). The caregiver returned and picked Sophie up for the final time.

The settled observation was conducted during Nap 3 at the ECEC (B). Sophie was put down and received a brief period of interaction from the caregiver (5 minutes) before the caregiver stopped interacting but stayed present in the room for a considerable length (68 minutes). The caregiver interacted with Sophie briefly (2 minutes) before getting her up.

The settled observation at home was conducted during Nap 4 ($A_1$). Sophie received interaction from her caregiver for a period of time (7 minutes) before the caregiver left for a considerable length of time (51 minutes). The caregiver returned and interacted momentarily (1 minute) and picked Sophie up.

*Tabular analysis across naps and across settings*

Tables 5 and 6 display specific information around Sophie's sleep variables aggregated nap-by-nap in the home setting and the ECEC respectively.

Table 5.

*Sophie's sleep variables and caregiver presence/interaction during home naps.*

| | **Nap 1 (Thur)** | **Nap 2 (Fri)** | **Nap 3 (Fri)** | **Nap 4 (Fri)** | **Nap 1 (Thur)** | **Nap 2 (Fri)** | **Nap 3 (Fri)** | **Nap 4 (Fri)** |
|---|---|---|---|---|---|---|---|---|
| Sleep Variables | | | | | Sleep Variable Percentages | | | |
| **Time down** | 10.05am | 9.49am | 10.08am | 9.49am | | | | |
| **Time up** | 12.55pm | 12.29pm | 11.29am | 10.47am | | | | |
| **Total nap period** (mins) | 171 | 161 | 82 | 59 | | | | |
| **Length of nap sleep** (mins) | 151 | 111 | 0 | 51 | 88% | 68% | N/A | 86 |
| **Time crying** (mins) | 2 | 11 | 11 | 4 | 1% | 7% | 13% | 7% |
| **Sleep-onset latency** (mins) | 14 | 48 | N/A | 3 | | | | |
| **Time in active sleep** (mins) | 137 | 99 | N/A | 36 | 80% | 61% | N/A | 61% |
| **Time in quiet sleep** (mins) | 14 | 10 | N/A | 15 | 8% | 6% | N/A | 25% |
| **Time awake** (mins) | 20 | 50 | 82 | 8 | 11% | 45% | 100% | 14% |
| **Time out of nap location** (mins) | 0 | 10 | 12 | 0 | 0% | 6% | 15% | 0% |
| **Sleep efficiency** (%) | 88 | 68 | N/A | 86 | 88% | 68% | N/A | 86% |
| Caregiver intervention | | | | | | | | |
| **Caregiver absent** (mins) | 152 | 110 | 0 | 51 | 86% | 68% | 0% | 89% |
| **Caregiver present only** (mins) | 0 | 0 | 3 | 0 | 0% | 0% | 4% | 0% |
| **Caregiver present with interaction** (mins) | 19 | 41 | 67 | 8 | 14% | 29% | 82% | 11% |

Table 6.

*Sophie's sleep variables and caregiver presence/interaction during ECEC naps.*

| | **Nap 1 (Wed)** | **Nap 2 (Fri)** | **Nap 3 (Thur)** | **Nap 1 (Wed)** | **Nap 2 (Fri)** | **Nap 3 (Thur)** |
|---|---|---|---|---|---|---|
| Sleep Variables | | | | Sleep Variable Percentages | | |
| **Time down** | 10.46am | 10.48am | 11.46am | | | |
| **Time up** | 11.34am | 12.31pm | 1.01pm | | | |
| **Total nap period** (mins) | 49 | 103 | 75 | | | |
| **Length of nap sleep** (mins) | 22 | 94 | 68 | 45% | 91% | 91% |
| **Time crying** (mins) | 24 | 0 | 4 | 49% | 0% | 5% |
| **Sleep-onset latency** (mins) | 13 | 5 | 4 | | | |
| **Time in active sleep** (mins) | 14 | 74 | 31 | 29% | 72% | 41% |
| **Time in quiet sleep** (mins) | 8 | 29 | 37 | 16% | 28% | 49% |
| **Time awake** (mins) | 27 | 8 | 7 | 55% | 8% | 9% |
| **Time out of nap location** (mins) | 0 | 0 | 0 | 0% | 0% | 0% |
| **Sleep efficiency** (%) | 45 | 91 | 91 | 45% | 91% | 91% |
| Caregiver intervention | | | | | | |
| **Caregiver absent** (mins) | 0 | 0 | 0 | 0% | 0% | 0% |
| **Caregiver present only** (mins) | 22 | 95 | 68 | 45% | 92% | 91% |
| **Caregiver present with interaction** (mins) | 27 | 8 | 7 | 55% | 8% | 9% |

Sophie's time that she was put down at home stayed reasonably consistent across the baseline, transition, and settled phases of observations (10.05am, 9.49am, 10.08am, and 9.49am respectively). The time she was put down at the ECEC was consistent during the transition period (Naps 1 and 2) at 10.46am and 10.48am respectively, however she was put down for Nap 3 (during settled observation) at the ECEC almost an hour later at 11.46am.

Sophie's total nap period varied across the time and across the settings. During Sophie's baseline data at home (Nap 1), her total nap period was 171 minutes and she was awake for 20 minutes of this. Sophie's total nap period during the first week of the transition phase varied across settings as her first ECEC nap had a total nap period of 49 minutes, while her nap at home during this week (Nap 2) had a total nap period of 161 minutes. More variations across settings occurred during the second week of the transitioning phase as Sophie's total nap period at the ECEC during her second nap was 103 minutes, while Nap 3 at home had a total nap period of 82 minutes. On observation of Sophie settled at the ECEC, Sophie's total nap period at the ECEC was 75 minutes during Nap 3, and the total nap period at home was 59 minutes during Nap 4. These were both considerably shorter than the total nap period during the baseline.

Sophie engaged in 137 minutes of AS and 14 minutes of QS during her baseline at home (Nap 1). However over the transition period the amount of time spent in each sleep state varied, as she spent 14 minutes in AS and 8 minutes in QS during Nap 1 at the ECEC, and 99 minutes in AS and 10 minutes in QS during Nap 2 at home during the first week of transition. During the second transition week, no sleep data was gained in the home (Nap 3) as no sleep occurred, however during her nap at the ECEC (Nap 2) Sophie engaged in 74 minutes of AS

and 29 minutes of QS. Once Sophie was settled at the ECEC, the time she spent in sleep states across the settings was similar, as during Nap 3 at the ECEC Sophie engaged in 31 minutes of AS and 37 minutes of QS, while during Sophie's fourth nap at home she engaged in 36 minutes of AS and 35 minutes of QS.

The sleep-onset latency during Sophie's baseline was 14 minutes, and she cried for 2 minutes during the total nap period. However the sleep-onset latency was longer in the home setting during Nap 2 than in the ECEC during Nap 1, as this was 13 minutes in the ECEC and 48 minutes at home. During this time, Sophie cried for almost twice the length at the ECEC as she did at home, as she spent 24 minutes crying at the ECEC during Nap 1 and 11 minutes crying at home during Nap 2. This differed from Nap 2 at the ECEC as Sophie's sleep-onset latency was 5 minutes, and she did not cry at all during this nap. Sophie did not have a sleep-onset latency during Nap 3 at home as she did not engage in any sleep, however she cried for a total of 11 minutes. Once settled at the ECEC, it was found that the amount of time spent crying and the sleep-onset latency were consistent across the settings. During Nap 3 at the ECEC, the sleep-onset latency was 4 minutes and 4 minutes was spent crying, while during Nap 4 at home, the sleep-onset latency was 3 minutes, and the amount of time spent crying was 4 minutes.

During Sophie's baseline at home, sleep efficiency was 88%. This varied in both settings over the transition period. During the transition phase Sophie's home naps (Naps 2 and 3) had sleep efficiencies of 68% and not applicable (respectively), as she did not engage in any sleep during Nap 3 at home, while Nap 1 at the ECEC had a sleep efficiency of 45% and Nap 2 at the ECEC had a sleep efficiency of 91%. Once settled at the ECEC, the sleep efficiencies

were reasonably consistent across settings with the sleep efficiency during Nap 4 at home being 86% while her sleep efficiency during Nap 3 at the ECEC was 91%.

The caregiver presence and interaction varied over the naps and the settings. During the baseline (Nap 1 at home), Sophie received interaction from her caregiver for 19 minutes of this nap and her caregiver was absent for the rest of the nap. The amount of time spent interacting and with the caregiver present without interaction during Nap 1 at the ECEC was evenly distributed (27 minutes and 22 minutes respectively), and the caregiver was never absent from the room. However in the home during Nap 2, there was interaction from the caregiver for 41 minutes and the caregiver was absent for the remainder of the nap (110 minutes). Sophie received 8 minutes of caregiver interaction during Nap 2 at the ECEC, and the caregiver was present without interaction for the remaining 95 minutes of the nap. However, Sophie's caregiver was also present for the total nap period during Nap 3 at home, however 67 minutes of this were with interaction. Once settled at the ECEC the amount of caregiver interaction received across the settings was consistent as during Nap 3 at the ECEC Sophie received 7 minutes of interaction, while at home during Nap 4 she received 8 minutes of interaction.

Table 7 displays Sophie's overall means across the two settings. Overall Sophie had longer total nap periods at home (118.3 minutes) than at the ECEC (75.7 minutes), and had longer sleep-onset latency at home (16.3 minutes) compared with the ECEC (7.3 minutes). Sophie spent longer in AS at home (68 minutes) than in the ECEC (39.7 minutes), however she spent longer in QS at the ECEC (24.7 minutes) than at home (9.8 minutes). Sophie's sleep efficiency was overall higher at the ECEC (75.7%) than at home (60.5%), however she spent

more time overall crying at the ECEC (9.3 minutes) than at home (7 minutes). Sophie received more interaction overall at home (33.8 minutes) than at the ECEC (14 minutes).

Table 7.

*Sophie's nap means across the home and ECEC settings.*

| | **Home naps** | **ECEC naps** |
|---|---|---|
| Sleep variables | Means | Means |
| **Total nap period** (mins) | 118.3 | 75.7 |
| **Length of nap sleep** (mins) | 78.3 | 61.3 |
| **Time spent in active sleep** (mins) | 68.0 | 39.7 |
| **Time spent in quiet sleep** (mins) | 9.8 | 24.7 |
| **Time cry** (mins) | 7.0 | 9.3 |
| **Sleep-onset latency** (mins) | 16.3 | 7.3 |
| **Sleep efficiency** (%) | 60.5 | 75.7 |
| Caregiver interaction | | |
| **Caregiver absent** (mins) | 78.3 | 0 |
| **Caregiver present only** (mins) | 0.8 | 61.7 |
| **Caregiver present with interaction** (mins) | 33.8 | 14.0 |

## DISCUSSION SPECIFIC TO SOPHIE

The aim of this case study was to examine the quality of naps, both at home and at the ECEC, across the infant's transition to the ECEC, and when settled at the ECEC. This was to determine any differences or similarities between the two settings and across the transition period.

A number of differences were observed between the baseline and the first week of the transition phase. Total nap period, length of sleep, time spent in active sleep, and sleep efficiency were all noticeably higher during the baseline at home (Nap 1) than both first week transition observations (ECEC Nap 1 and home Nap 2). Time spent crying, and the amount of interaction received from caregivers was higher during the transition period in both settings than in the baseline. One variable remained reasonably constant across the three nap observations during the baseline and the first week of the transition phase, and that was the length of quiet sleep.

Several differences were noted across the two settings during the transition phase. It was found that during the first week of transition Sophie's naps in both the home and the ECEC varied considerably from the observations conducted in the second week of the transition phase. In the first week of the transition phase Sophie had the longest sleep-onset latencies, the lowest sleep efficiencies, and spent the most time crying, compared to the rest of the observed naps. In both settings during the first transition week, Sophie spent considerably more time in AS, particularly in the home setting, and there were high levels of caregiver interaction during these naps. However, during the second week of the transition period, the observations across settings varied greatly, as Sophie did not engage in any sleep during her total nap period at home, while her sleep efficiency at the ECEC this week was 91%. Sophie spent more time in AS during the second observation at the ECEC, and it was also her longest observed total nap period. During Sophie's first transition week, she received high levels of caregiver interaction across both settings. However during her second transition week Sophie had a high level of caregiver intervention at home, which contrasted to the caregiver intervention experienced by Sophie at the ECEC during this period.

It is interesting to look at the variation between the two transitioning weeks, especially within the second week where it appears that her nap at the ECEC was starting to become more settled, while, unusually, she did not engage in any sleep at home. The mother reported nothing remarkable on the day where no sleep occurred. It is possible that Sophie was still adjusting at this time to changes in settings, caregivers, and routines.

Sophie's naps that occurred once settled were found to have a number of similarities in nap architecture across settings. These similarities across settings included reasonably even amounts of time being spent in both QS and AS, sleep-onset latency, and the amount of time spent crying. Sleep efficiency was found to be higher in the ECEC than in the home and the total nap period was also slightly longer in the ECEC than the home.

The amount of interaction received from the caregiver was also similar across settings once Sophie was settled at the ECEC, but higher levels of caregiver presence without interaction were found in the ECEC while the home had higher levels of caregiver absence. This was due to the ECEC policy requiring a teacher to be present in the sleep room whenever there is an infant sleeping.

This analysis suggests that once Sophie was settled at the ECEC her naps were reasonably similar across the two settings. However, these findings are also interesting due to the environmental differences, particularly as Sophie slept in a buggy at home and a cot at the ECEC. It is also interesting to note that Sophie's mother described her as a good sleeper; however she reported that Sophie wakes around twice a night. The literature suggests that

infants over the age of one year can generally sleep through the night and when this does not occur parents often report difficulties (Middlemiss, 2004; Sadeh et al., 2007). That Sophie's mother describes her as a typical sleeper is an example of how parents perceive their infant's sleep differently, and that sleep disturbance is only problematic when parents perceive and report it (France, 1989).

### Limitations of Case Study 1

A major limitation of this case study is that Sophie slept in a buggy at home, and slept in a cot at the ECEC. When put in the buggy, it was often placed outside in natural light, while the sleep room at the ECEC was darkened. It is therefore difficult to establish whether the differences found across this study were due to the transition to the ECEC, or whether they were due to sleeping in different locations (e.g. the cot and the buggy).

Relatively few observations in any phase was also a major limitation of this case study and because of this, the representativeness of the findings is uncertain. However, during the transition, variability was expected, as that can only be representative of the transition phase itself.

# CHAPTER 4

# CASE STUDY 2: CHARLIE – ALREADY SETTLED AT THE EARLY CHILDHOOD EDUCATION CENTRE

Charlie was a 16-month-old male who was described by his mother and the staff as already settled at the ECEC. Table 8 displays contextual information about Charlie's sleep routines and environments. The aim of this case study was to ascertain whether there were any differences between nap architecture at home and the ECEC, and to ascertain whether there were any differences between caregiver behaviour at home and the ECEC.

## METHOD SPECIFIC TO CHARLIE

### Design

This case study employed an across-setting case-study design using an AB sequence with three repeated measures where A = observations at home, and B = observations conducted at the ECEC.

### Procedure

A total of three naps were recorded in the home and were completed on three consecutive days as Charlie's parents wished to do it this way. Charlie had three naps recorded at the ECEC with one observation being done per week for three consecutive weeks.

Table 8.

*Participant information: Charlie.*

| Name: | Charlie |
|---|---|
| Age: | 16-months |
| Gender: | Male |
| Family composition: | Charlie lived at home with his mother, father, and older brother (33-months). |
| Sleep history: | Charlie's mother described him as a 'fantastic sleeper'. Charlie was moved into his brother's room at 6-months-old and transitioned into a cot with no concerns. |
| Home sleep environment: | Charlie slept in a cot in a room shared with his older brother, which was darkened during naps. |
| Naps at home: | Charlie had one nap per day at 10am lasting 2-3 hours. He had been doing this for a month. Charlie's typical sleep routine involved having a snack, being put into a sleep sack, being put down and bid "good sleep". |
| Night-time sleep: | Charlie's sleep routine involved reading books while having a bottle. At 7.30pm Charlie brushed his teeth, was put in his sleep sack, and bid "goodnight". Charlie was reported to sleep through the night and wake around 6.30-7am. |
| ECEC attendance: | Charlie attended the ECEC Monday through to Friday, 8.30am until 3.30pm. Charlie was observed at home on a Friday, Saturday, and Sunday. |
| Naps at ECEC: | Prior to the study Charlie was reported to have had one nap per day at the ECEC lasting for 1 ½ - 2 ½ hours. He had been doing this for three months. Charlie's teacher would tell him that it is time for bed, change his nappy, put him into his sleep sack and put him down. |
| Development: | Both Charlie's mother and his ECEC primary caregiver reported no concerns around Charlie's development. |

## RESULTS SPECIFIC TO CHARLIE

Charlie's data were analysed visually comparing naps across the two settings and the measurement periods. Figure 3 displays Charlie's nap activity across the length of the naps, while the caregiver presence and interaction across the length of the naps is displayed in Figure 4. Tables 9 and 10 display Charlie's overall nap data aggregated nap-by-nap within each setting, and Table 11 includes means across all of Charlie's naps.

## Data Analysis

Figure 3 displays Charlie's naps in both the home and the ECEC in chronological order. Charlie slept during each nap period at home and the ECEC.

*Graphical analysis across naps*

Charlie was awake for a period (6 minutes) during Nap 1 at home before going to sleep. Charlie engaged in AS (17 minutes) before transitioning to QS for a brief time (6 minutes). Charlie transitioned back to AS for a period (28 minutes) before engaging in QS for a time (12 minutes). Charlie engaged again in AS for a period (28 minutes) before transitioning to a period of QS (19 minutes). Charlie engaged in AS for a considerable period (67 minutes) before waking. Charlie was awake briefly (7 minutes) before he was picked up.

During Nap 2 at home, Charlie was awake for a period (8 minutes) before falling into AS for a period (23 minutes). Charlie transitioned to QS for a period (15 minutes) before engaging in AS for a time (29 minutes). Charlie transitioned to QS briefly (8 minutes) before engaging in AS for a considerable time (49 minutes). Charlie engaged in QS for a period (18 minutes) before waking and crying briefly (1 minute). Charlie lay awake for a time (27 minutes) before he was picked up.

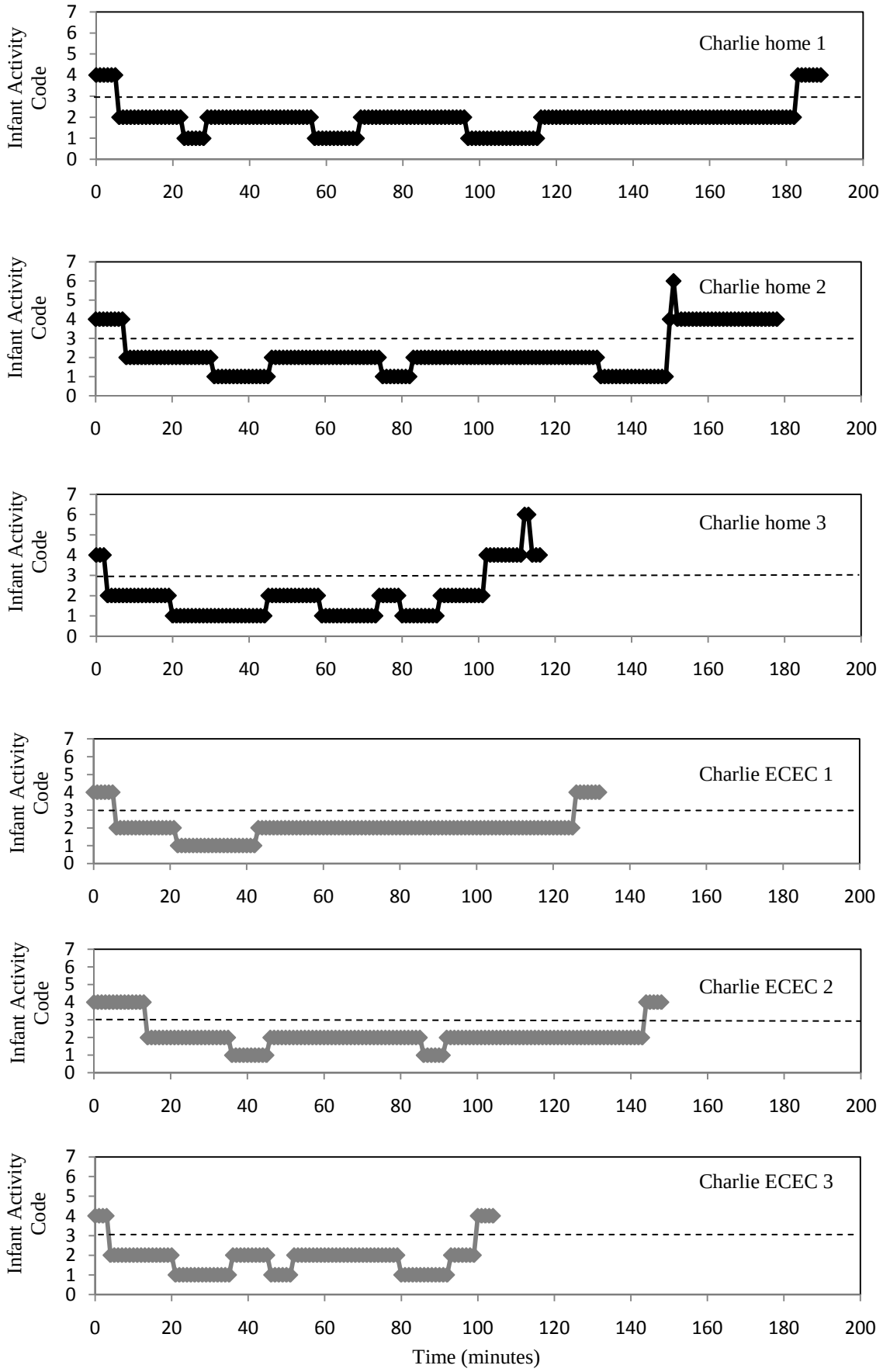


*Figure 3.* Charlie's naps at home and the ECEC in chronological order. Dotted line denotes demarcation between sleep (1, 2) and wake (4, 6, 7) codes.

Charlie was awake briefly (3 minutes) after being put down for Nap 3 at home. Charlie engaged in AS for a time (17 minutes) before transitioning to QS for a length of time (25 minutes). Charlie transitioned to AS for a period (14 minutes) before engaging in QS (15 minutes). Charlie engaged in AS briefly (6 minutes) before transitioning to QS for a period (10 minutes). Charlie engaged in AS for a period (12 minutes) before waking. Charlie lay awake for a time (10 minutes) before crying briefly (2 minutes), and lay awake for a brief time (2 minutes) before he was picked up.

During Nap 1 at the ECEC, Charlie lay awake briefly (4 minutes) before falling asleep into AS for a period (17 minutes). Charlie transitioned into QS for a time (15 minutes) before engaging in AS for a period (10 minutes). Charlie transitioned into QS briefly (6 minutes) before returning to AS (28 minutes). Charlie awoke and lay awake briefly (5 minutes) before he was picked up.

Charlie lay awake for a period (14 minutes) after being put down for Nap 2 at the ECEC. Charlie engaged in AS for a period (22 minutes) before transitioning to QS for a time (10 minutes). Charlie engaged in AS for a considerable time (40 minutes) before transitioning briefly to QS (6 minutes). Charlie entered into AS for a considerable period (52 minutes) before waking. Charlie lay awake briefly (5 minutes) before he was picked up.

During Nap 3 at the ECEC, Charlie lay awake briefly (6 minutes) before falling into AS for a period (16 minutes). Charlie transitioned into AS for a time (21 minutes) before re-entering

into AS for a considerable length of time (83 minutes). Charlie woke from his nap and lay awake briefly (7 minutes) before he was picked up.

Figure 4 displays Charlie's caregiver presence and interactions during each of the naps in chronological order. Charlie slept during each nap period at the home and the ECEC.

The caregiver interaction and presence was consistent across Charlie's three naps at home. Charlie received brief interaction from the caregiver as he was put down for each of his naps (1 minute, 2 minutes, and 2 minutes respectively). The caregiver was absent for the majority of each total nap period before returning briefly to interact (1 minute for each of the three naps) and get Charlie up.

Caregiver interaction and presence was also found to be consistent across Charlie's three naps at the ECEC. Charlie received brief interaction (1 minute, 1 minute, and 2 minutes respectively) from the caregiver each time he was put down for his naps at the ECEC. During Nap 2 at the ECEC he received brief interaction (1 minute) two minutes after he was put down, and he was still awake at this time. The caregiver was present for the majority of each of the naps, before interacting with Charlie once he woke (5 minutes, 1 minute, and 1 minute respectively) and getting him up.

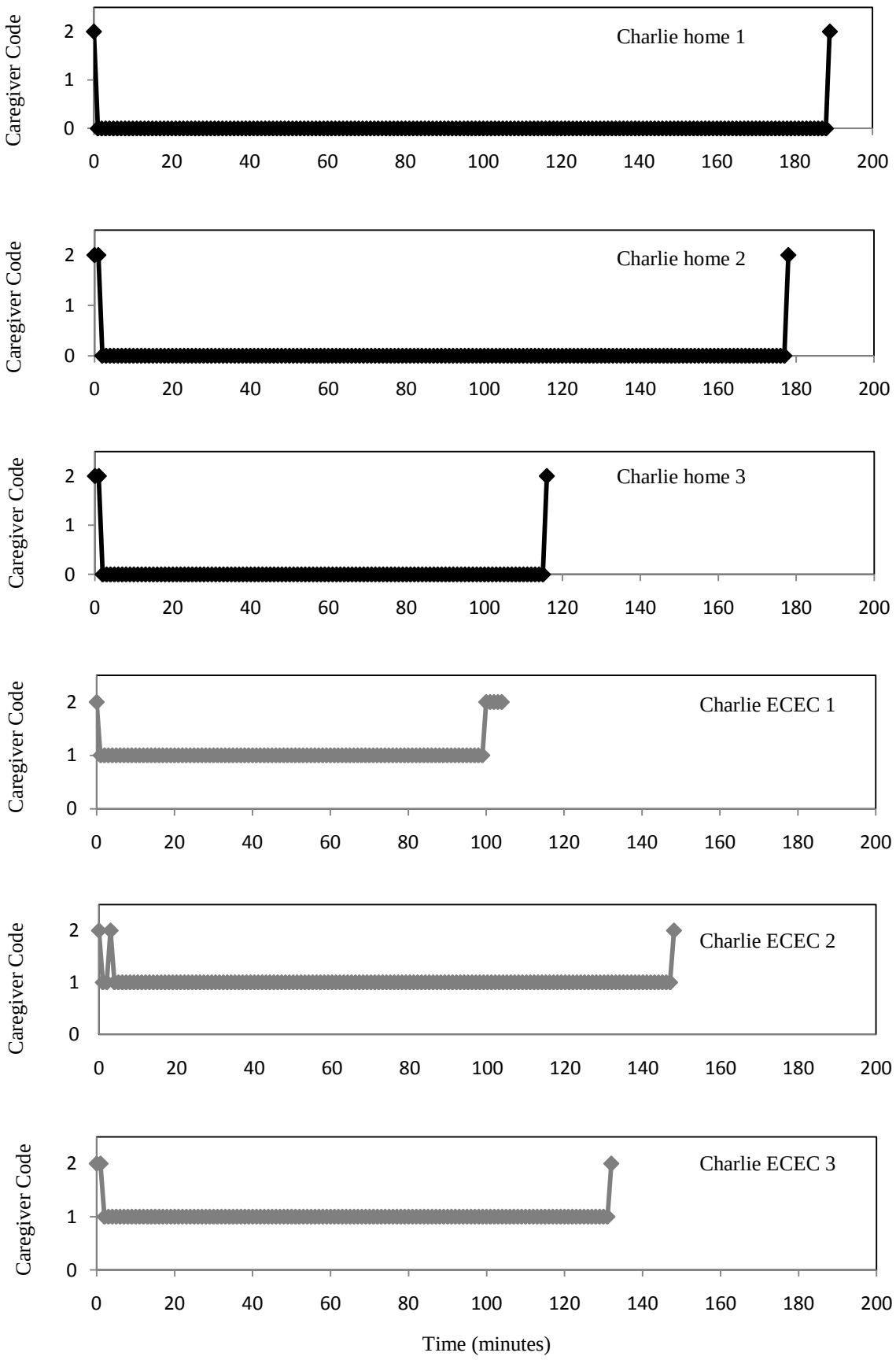


*Figure 4.* Caregiver presence and interactions during Charlie's naps at home and the ECEC in chronological order.

*Tabular analysis across naps and across settings*

Tables 9 and 10 display specific information around sleep variables aggregated nap-by-nap in the home and the ECEC respectively.

Charlie was put down at home around the same time for Nap 1 and Nap 2 (10.08am and 9.55am) and was put down for Nap 3 at 11.55am which was later than the first two naps. At the ECEC Charlie was put down for Nap 1 at 12.06pm, while he was put down for his Nap 2 and Nap 3 at 11.17am and 11.18am respectively.

Nap 1 and Nap 2 at home were consistent in their total nap period (190 minutes and 179 minutes respectively); however Nap 3 at home had a shorter total nap period of 117 minutes. At the ECEC, Nap 2 and Nap 3 had similar total nap periods with them lasting 149 and 133 minutes respectively, while the total nap period was 105 minutes during Nap 1.

The sleep efficiency varied slightly between Charlie's three naps at home, as Nap 1 had a sleep efficiency of 93%, Nap 2 was 79%, and Nap 3 was 85%. Charlie's sleep efficiency at the ECEC was more consistent with his sleep efficiency being 91%, 87%, and 90% respective to the order of the order of the naps.

Table 9.
*Charlie's sleep variables and caregiver presence/interaction during home naps.*

| | **Nap 1 (Fri)** | **Nap 2 (Sat)** | **Nap 3 (Sun)** | **Nap 1 (Fri)** | **Nap 2 (Sat)** | **Nap 3 (Sun)** |
|---|---|---|---|---|---|---|
| Sleep Variables | | | | Sleep Variable Percentages | | |
| **Time down** | 10.08am | 9.55am | 11.55am | | | |
| **Time up** | 1.18pm | 12.54pm | 1.52pm | | | |
| **Total nap period** (mins) | 190 | 179 | 117 | | | |
| **Length of nap sleep** (mins) | 177 | 142 | 99 | 93% | 79% | 85% |
| **Time crying** (mins) | 0 | 1 | 2 | 0% | 0.005% | 0.01% |
| **Sleep-onset latency** (mins) | 6 | 7 | 2 | | | |
| **Time in active sleep** (mins) | 140 | 101 | 49 | 74% | 56% | 42% |
| **Time in quiet sleep** (mins) | 37 | 41 | 50 | 19% | 23% | 43% |
| **Time awake** (mins) | 13 | 37 | 18 | 7% | 20% | 14% |
| **Time out of nap location** (mins) | 0 | 0 | 0 | 0% | 0% | 0% |
| **Sleep efficiency** (%) | 93 | 79 | 85 | 93% | 79% | 85% |
| Caregiver intervention | | | | | | |
| **Caregiver absent** (mins) | 188 | 176 | 114 | 99% | 98% | 97% |
| **Caregiver present only** (mins) | 0 | 0 | 0 | 0% | 0% | 0% |
| **Caregiver present with interaction** (mins) | 2 | 3 | 3 | 1% | 2% | 3% |

Table 10.
*Charlie's sleep variables and caregiver presence/interaction during ECEC naps.*

| | **Nap 1 (Wed)** | **Nap 2 (Fri)** | **Nap 3 (Wed)** | **Nap 1 (Wed)** | **Nap 2 (Fri)** | **Nap 3 (Wed)** |
|---|---|---|---|---|---|---|
| Sleep Variables | | | | Sleep Variable Percentages | | |
| **Time down** | 12.06pm | 11.17am | 11.18am | | | |
| **Time up** | 1.51pm | 1.46pm | 1.31pm | | | |
| **Total nap period** (mins) | 105 | 149 | 133 | | | |
| **Length of nap sleep** (mins) | 96 | 130 | 120 | 91% | 87% | 90% |
| **Time crying** (mins) | 0 | 0 | 0 | 0% | 0% | 0% |
| **Sleep-onset latency** (mins) | 4 | 13 | 5 | | | |
| **Time in active sleep** (mins) | 62 | 114 | 99 | 59% | 77% | 74% |
| **Time in quiet sleep** (mins) | 34 | 16 | 21 | 32% | 11% | 16% |
| **Time awake** (mins) | 9 | 19 | 13 | 9% | 13% | 10% |
| **Time out of nap location** (mins) | 0 | 0 | 0 | 0% | 0% | 0% |
| **Sleep efficiency** (%) | 91 | 87 | 90 | 91% | 87% | 90% |
| Caregiver intervention | | | | | | |
| **Caregiver absent** (mins) | 0 | 0 | 0 | 0% | 0% | 0% |
| **Caregiver present only** (mins) | 99 | 146 | 130 | 94% | 98% | 98% |
| **Caregiver present with interaction** (mins) | 6 | 3 | 3 | 6% | 2% | 2% |

The amount of time spent in AS varied across settings with Charlie spending 140 minutes, 101 minutes, and 49 minutes in AS during his three respective naps at home, while he spent 34 minutes, 16 minutes, and 21 minutes in AS during his three respective naps at the ECEC. However, the amount of time spent in QS varied in the ECEC (34 minutes, 16 minutes, and 21 minutes respectively) but remained fairly consistent at home (37 minutes, 41 minutes, and 50 minutes). Charlie's sleep-onset latency remained reasonably consistent across both settings across all of his naps.

Charlie's caregiver interaction was consistent across both settings and across all of his naps. However, the caregiver at the ECEC was never absent and was present (without interaction) for the majority of his naps, while his caregiver at home was never present without interaction, and was absent for the majority of the naps.

Table 11 displays Charlie's overall means across his naps at home and the ECEC. These means demonstrate that Charlie's total nap period tended to be longer at home than at the ECEC. Charlie spent more time overall in both AS and QS at home than he did at the ECEC. Charlie's sleep-onset latency tended to be slightly longer in the ECEC than in the home; however his sleep efficiency was higher in the ECEC than in the home. The caregiver interaction was reasonably consistent across the two settings, however the caregiver presence without interaction was only observed in the ECEC while caregiver absence was only observed in the home.

Table 11.

*Charlie's nap means across the home and ECEC settings.*

| | **Home naps** | **ECEC naps** |
|---|---|---|
| Sleep variables | Means | Means |
| **Total nap period** (mins) | 162.0 | 129.0 |
| **Length of nap sleep** (mins) | 139.3 | 115.3 |
| **Time spent in active sleep** (mins) | 96.7 | 91.7 |
| **Time spent in quiet sleep** (mins) | 42.7 | 23.7 |
| **Time cry** (mins) | 1.0 | 0 |
| **Sleep-onset latency** (mins) | 5.0 | 7.3 |
| **Sleep efficiency** (%) | 85.7 | 89.3 |
| Caregiver interaction | | |
| **Caregiver absent** (mins) | 159.3 | 0 |
| **Caregiver present only** (mins) | 0 | 96.7 |
| **Caregiver present with interaction** (mins) | 2.7 | 3.3 |

## DISCUSSION SPECIFIC TO CHARLIE

The objective of this case study was to examine the quality of sleep in Charlie, who was described as a "typical sleeper", across two settings. More specifically, this case study aimed to examine whether there were any differences or similarities between the quality of his sleep across the home and the ECEC, and whether there were any differences between caregiver behaviour at home and the ECEC.

Charlie's total nap periods were generally found to be longer in the home than in the ECEC, and Charlie's sleep efficiency was often of a higher percentage in the ECEC than at home. It is possible that this was due to the presence of a teacher in the sleep room at the ECEC at all times, as Charlie was picked up soon after he woke from his nap. This differed from his naps

at home, as Charlie was often observed to sit/lie in his cot and play with his toys, making minimal noise, and was only picked up once his parents checked on him and found him to be awake.

Taking into account the total nap period length differences, Charlie's nap architecture was reasonably similar across settings however the amount of time that was spent in each sleep state during each nap varied. Charlie spent more time in AS than in QS across both settings, contrasting with the findings of Torok (2009) who reported that infants with sleep difficulties engaged in more QS than AS across both home and ECEC settings. It is possible that this could indicate a difference between infants who have sleep difficulties and those who are described as "typical sleepers".

Charlie's sleep-onset latency was similar across settings, although during one nap at the ECEC his sleep-onset latency was 13 minutes, which was considerably longer than his sleep-onset latency during the rest of his observed naps across both settings. It is possible that the occurrence of a significant aftershock shortly after Charlie had been put down may have disrupted his sleep-onset latency during this nap. Charlie's sleep efficiency was also reasonably similar across settings, suggesting that he was awake for a reasonably consistent period of time when he was put down for a nap, regardless of the length of the sleep during the nap. However, his sleep efficiency varied slightly across home naps.

Charlie's caregiver interaction was reasonably consistent across both settings, and indicated Charlie's ability to be put down without protest and demonstrated that he did not need

caregiver interaction to assist him to get to sleep. However the caregiver presence differed from setting to setting, as in the home setting the caregiver was absent for the remainder of the nap period, while at the ECEC the caregiver was present without interaction for the remainder of the nap period.

## Limitations of Case Study 2

The major limitation of this case study was that three home observations were conducted on three consecutive days, and the three ECEC observations were conducted one per week over three consecutive weeks. This was a limitation as sampling from consecutive nights can reduce the influence of time-dependent developmental variables however this requires replication of blocks of observations to detect longer-term changes. The replication of blocks of observations was not conducted in this study and this did not allow longer-term changes to be observed. It would have been better if the replication of blocks of observations had been done over both settings, or if the same number of observations were done in both settings at the same intervals (e.g. one per week for three consecutive weeks). The home observations were also limited as they occurred on a Friday, Saturday, and Sunday, and it is possible that naps differ on weekends than on weekdays, particularly with infants who are attending ECECs full time.

# CHAPTER 5

# CASE STUDY 3: SETH – ALREADY SETTLED AT EARLY CHILDHOOD EDUCATION CENTRE

Seth was a 17-month-old male who was described by his mother and ECEC staff as settled at the ECEC. Table 12 displays contextual information about Seth's sleep routines and environments. The aim of this case study was to ascertain whether there were any differences between the nap architecture at home and the ECEC, and to ascertain whether there were any differences between caregiver behaviour at the home and the ECEC.

## METHOD SPECIFIC TO SETH

### Design

This case study employed a case-study across-settings design using an ABABAB sequence where A = observations at home, and B = observations conducted at the ECEC.

### Procedure

Seth had one observation at home per week for three consecutive weeks and this was due to scheduling issues or ECEC attendance. Seth had three naps recorded at the ECEC, later in the same weeks, with one observation being done per week for three consecutive weeks.

Table 12.

*Participant information: Seth.*

| Name: | Seth |
|---|---|
| Age: | 17-months |
| Gender: | Male |
| Family composition: | Seth lived at home with his mother, father, and older sister (5-years-old). |
| Sleep history: | Seth had always slept in a cot, which was in the parent's room for the first 5 months. |
| Home sleep environment: | Seth slept in a cot in his own bedroom, which was darkened for naps. |
| Naps at home: | Seth had been having one nap at 9.30am for 2-3 hours for a month, although occasionally had two naps. Before this he had two 2-hour naps per day. Seth's typical nap routine at home was taking a bottle to bed, being put in his sleep sack and put down. |
| Night-time sleep: | Seth was reported to sleep through the night. His night-time routine involved reading books and having a bottle, brushing his teeth, put into sleep sack, and put down around 7pm, waking around 6.30am. |
| ECEC attendance: | Seth attended the ECEC Monday through to Friday from 8.15am until 3.15pm. Seth was observed at home on three consecutive Sundays. |
| Naps at ECEC: | Seth was reported to have one nap per day at the ECEC at 11.30am for 50 minutes. Seth's nap routine involved having a bottle, then put into his sleep sack and put down. |
| Development: | Both Seth's mother and his primary caregiver at the ECEC reported no concerns around his development. |

## RESULTS SPECIFIC TO SETH

Seth's data were analysed visually comparing naps across the two settings and the measurement periods. Figure 5 displays Seth's nap activity across the length of the naps, while the caregiver presence and interaction across the length of the naps is displayed in Figure 6. Tables 13 and 14 display Seth's overall nap data aggregated nap-by-nap within each setting, and Table 15 includes means across all of Seth's naps.

## Data Analysis

Figure 5 displays Seth's naps at the home and the ECEC in chronological order. Seth slept during each of the naps in the home and the ECEC.

*Graphical analysis across naps*

During Nap 1 at home, Seth lay awake for a period (18 minutes) before falling into AS for a time (26 minutes). Seth transitioned to QS briefly (6 minutes) before reengaging in AS for a period (17 minutes). Seth transitioned to QS for a time (17 minutes) before waking. Seth lay awake in his cot for a considerable length (68 minutes) before being picked up.

Seth lay awake for a period (10 minutes) during Nap 1 at the ECEC. Seth transitioned from wake into AS for a time (20 minutes) before engaging in QS for a period (11 minutes). Seth transitioned into AS sleep for a time (13 minutes) before engaging in a considerable length of QS (46 minutes). Seth woke and lay awake for a period (11 minutes) before he was picked up.

Seth lay awake for a length of time (28 minutes) after being put down for Nap 2 at home. Seth engaged in AS (18 minutes) for a period before transitioning to QS briefly (7 minutes). Seth engaged in a brief period of AS (6 minutes) before transitioning to a length of QS (12 minutes). Seth awoke and lay in his cot for a period (19 minutes) before he was picked up.

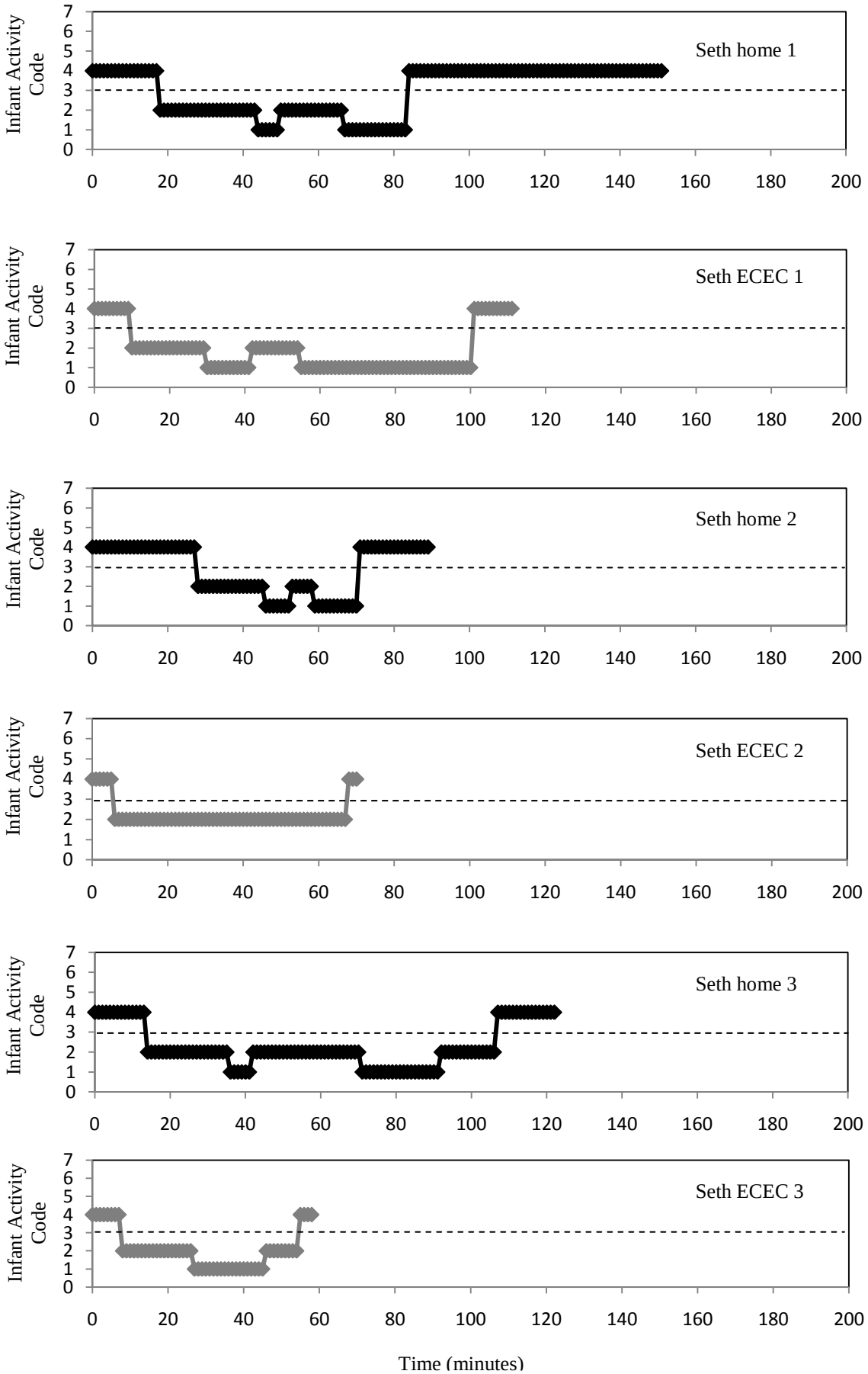


*Figure 5.* Seth's naps at home and the ECEC in chronological order. Dotted line denotes demarcation between sleep (1, 2) and wake (4, 6, 7) codes.

During Nap 2 at the ECEC Seth lay awake briefly (6 minutes) before engaging in a considerable length of AS (62 minutes). Seth lay awake briefly (3 minutes) before he was picked up.

Seth lay awake for a period (14 minutes) during Nap 3 at home before engaging in AS for a time (22 minutes). Seth transitioned into a brief period of QS (6 minutes) before engaging again in AS for a time (29 minutes). Seth transitioned into a period of QS (21 minutes) before reengaging in AS for a time (15 minutes). Seth woke and lay awake for a period (16 minutes) before he was picked up.

During Nap 3 at the ECEC, Seth lay awake for a time (8 minutes) before transitioning to AS for a period (19 minutes). Seth engaged in QS for a time (19 minutes) before transitioning once again to AS for a period (9 minutes). Seth woke and lay awake for a brief period (4 minutes) before being picked up.

Figure 6 displays Seth's caregiver presence and interactions during each of the naps across both settings in chronological order. Seth slept during each nap period at the home and the ECEC.

Seth received brief interaction (1 minute) from his caregiver as he was put down for Nap 1 at home. The caregiver was absent for the majority of the nap (150 minutes) before returning briefly (1 minute) to interact and get Seth up.

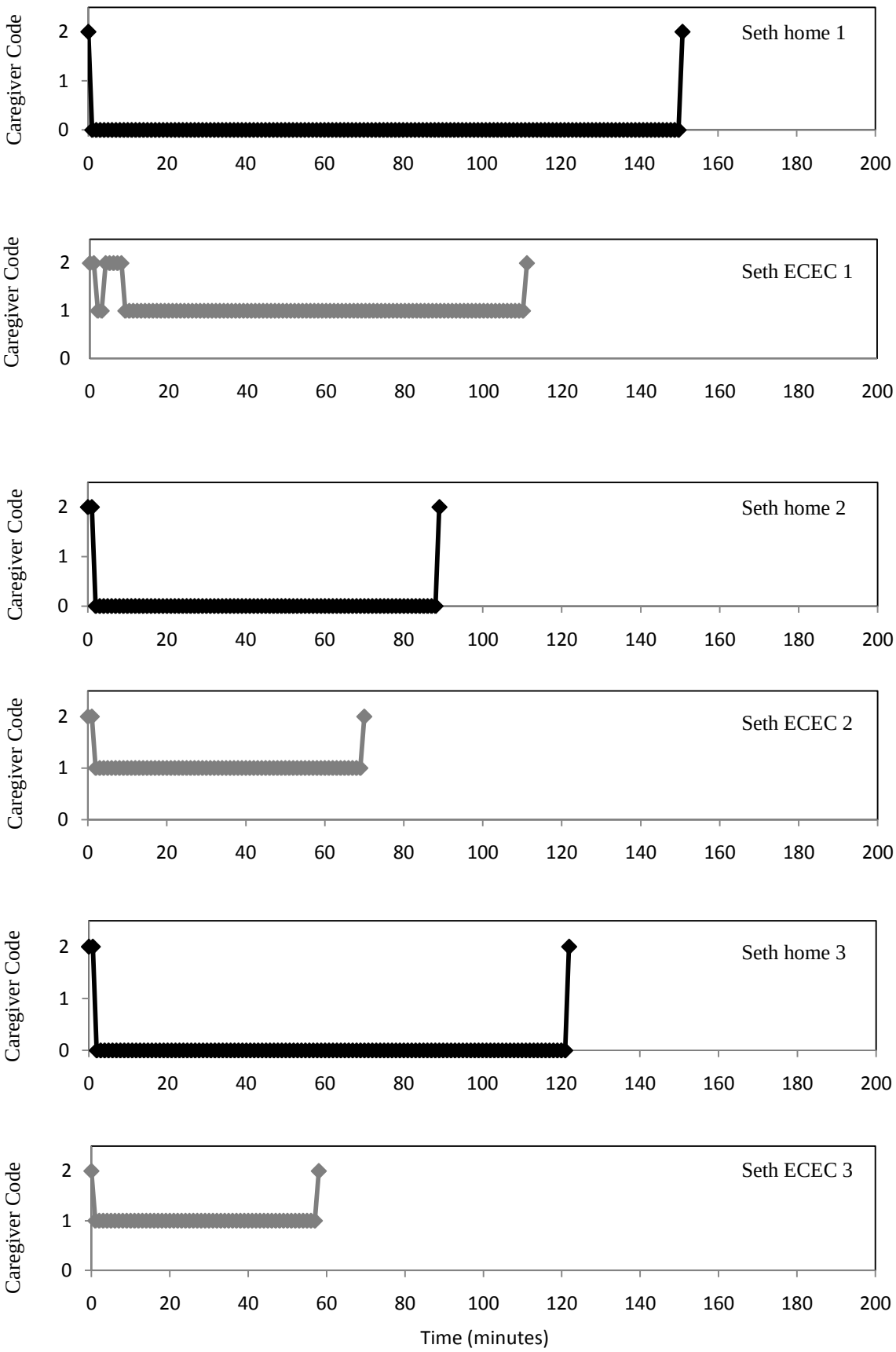


*Figure 6.* Caregiver presence and interactions during Seth's naps at home and the ECEC in chronological order.

During Nap 1 at the ECEC, Seth briefly received interaction from his caregiver (2 minutes) before the caregiver momentarily stopped interacting (2 minutes) but was still present in the room. The caregiver interacted briefly (5 minutes) with Seth again. The caregiver stopped interacting but was still present in the room for the majority of the nap (102 minutes). The caregiver interacted briefly (1 minute) with Seth and picked him up.

Seth received brief interaction (2 minutes) from his caregiver during Nap 2 at home before the caregiver left the room for most of the nap (87 minutes). The caregiver returned and interacted with Seth briefly (1 minute) and he was picked up.

During Nap 2 at the ECEC, Seth received brief interaction from his caregiver (2 minutes) followed by the caregiver remaining in the room (with no interaction) for the remainder of the nap (68 minutes). Seth received momentary interaction from the caregiver (1 minute) as he was picked up.

During Nap 3 at home Seth received brief interaction (2 minutes) from his caregiver, before the caregiver left the room for the majority of the nap (120 minutes). The caregiver returned and interacted briefly (1 minute) as Seth was picked up.

During Nap 3 at the ECEC, Seth received momentary interaction (1 minute) from his caregiver before the caregiver ceased interacting but remained in the room for the majority of

the nap (57 minutes). The caregiver briefly interacted (1 minute) with Seth as he was picked up.

*Tabular analysis across naps and across settings*

Tables 13 and 14 display specific information around Seth's sleep variables aggregated nap-by-nap in the home and the ECEC respectively.

The time that Seth was put down to sleep at home varied, as he was put down for Nap 1 at 10.40am, Nap 2 at 9.41am, and Nap 3 at 3.22pm. However the times that Seth was put down at the ECEC were reasonably consistent (11.31am, 11.53am, and 11.29am respectively).

The total nap periods of Seth's naps at home varied in length (152 minutes, 90 minutes, and 123 minutes respectively), and his total nap periods at the ECEC also varied in length (112 minutes, 71 minutes, and 59 minutes respectively). Seth did not cry during any of his naps in either setting.

Seth's sleep efficiency at home for each of the naps varied (43%, 48%, and 76% respectively), while the sleep efficiency of his naps at the ECEC were reasonably consistent (82%, 87%, and 80% respectively). Seth's sleep-onset latency also varied in the home setting (17 minutes, 27 minutes, and 13 minutes respectively), while his sleep-onset latency in the ECEC was reasonably consistent (9 minutes, 5 minutes, and 7 minutes respectively).

Table 13.

*Seth's sleep variables and caregiver presence/interaction during home naps.*

| | **Nap 1 (Sun)** | **Nap 2 (Sun)** | **Nap 3 (Sun)** | **Nap 1 (Sun)** | **Nap 2 (Sun)** | **Nap 3 (Sun)** |
|---|---|---|---|---|---|---|
| Sleep Variables | | | | Sleep Variable Percentages | | |
| **Time down** | 10.40am | 9.41am | 3.22pm | | | |
| **Time up** | 1.12pm | 11.11am | 5.25pm | | | |
| **Total nap period** (mins) | 152 | 90 | 123 | | | |
| **Length of nap sleep** (mins) | 66 | 43 | 93 | 43% | 48% | 76% |
| **Time crying** (mins) | 0 | 0 | 0 | 0% | 0% | 0% |
| **Sleep-onset latency** (mins) | 17 | 27 | 13 | | | |
| **Time in active sleep** (mins) | 43 | 24 | 66 | 28% | 27% | 54% |
| **Time in quiet sleep** (mins) | 23 | 19 | 26 | 15% | 21% | 21% |
| **Time awake** (mins) | 86 | 47 | 30 | 57% | 52% | 24% |
| **Time out of nap location** (mins) | 0 | 0 | 0 | 0% | 0% | 0% |
| **Sleep efficiency** (%) | 43 | 48 | 76 | 43% | 48% | 76% |
| Caregiver intervention | | | | | | |
| **Caregiver absent** (mins) | 145 | 87 | 120 | 51% | 97% | 98% |
| **Caregiver present only** (mins) | 0 | 0 | 0 | 45% | 0% | 0% |
| **Caregiver present with interaction** (mins) | 7 | 3 | 3 | 4% | 3% | 2% |

Table 14.

*Seth's sleep variables and caregiver presence/interaction during ECEC naps.*

| | **Nap 1 (Wed)** | **Nap 2 (Fri)** | **Nap 3 (Wed)** | **Nap 1 (Wed)** | **Nap 2 (Fri)** | **Nap 3 (Wed)** |
|---|---|---|---|---|---|---|
| Sleep Variables | | | | Sleep Variable Percentages | | |
| **Time down** | 11.31am | 11.53am | 11.29am | | | |
| **Time up** | 1.23pm | 12.54pm | 12.28pm | | | |
| **Total nap period** (mins) | 112 | 71 | 59 | | | |
| **Length of nap sleep** (mins) | 92 | 62 | 47 | 82% | 87% | 80% |
| **Time crying** (mins) | 0 | 0 | 0 | 0% | 0% | 0% |
| **Sleep-onset latency** (mins) | 9 | 5 | 7 | | | |
| **Time in active sleep** (mins) | 34 | 62 | 27 | 30% | 87% | 46% |
| **Time in quiet sleep** (mins) | 58 | 0 | 20 | 52% | 0% | 34% |
| **Time awake** (mins) | 20 | 9 | 12 | 18% | 13% | 20% |
| **Time out of nap location** (mins) | 0 | 0 | 0 | 0% | 0% | 0% |
| **Sleep efficiency** (%) | 82 | 87 | 80 | 82% | 87% | 80% |
| Caregiver intervention | | | | | | |
| **Caregiver absent** (mins) | 0 | 0 | 0 | 0% | 0% | 0% |
| **Caregiver present only** (mins) | 104 | 68 | 57 | 93% | 96% | 97% |
| **Caregiver present with interaction** (mins) | 8 | 3 | 2 | 7% | 4% | 3% |

The time that Seth spent in AS varied in both settings. Seth spent 43 minutes, 24 minutes, and 66 minutes in AS during his respective naps at home, while he spent 34 minutes, 62 minutes, and 27 minutes in AS during his respective naps at the ECEC. Seth spent a reasonably consistent amount of time in QS during his naps at home (23 minutes, 19 minutes, and 26 minutes respectively) while the amount of time spent in QS at the ECEC varied across his naps (58 minutes, 0 minutes, and 20 minutes respectively).

The amount of caregiver interaction Seth received was reasonably consistent across both settings as during his home naps he received 7 minutes, 3 minutes, and 3 minutes respectively, while during his ECEC naps he receive 8 minutes, 3 minutes, and 2 minutes respectively. A caregiver was always present during Seth's naps at the ECEC, while a caregiver was absent (apart from when interacting) during Seth's naps at the home.

Table 15 displays Seth's nap means across both the home and the ECEC. It demonstrates that Seth had considerably longer total nap periods at home than in the ECEC, however Seth's sleep efficiency was higher in the ECEC than in the home. The amount of time spent overall in both QS and AS were reasonably similar across each of the settings. Seth's sleep-onset latency was generally higher in the home than in the ECEC. The amount of caregiver interaction that Seth received was reasonably similar across settings.

Table 15.

*Seth's nap means across the home and ECEC settings.*

| | **Home naps** | **ECEC naps** |
|---|---|---|
| Sleep variables | Means | Means |
| **Total nap period** (mins) | 121.7 | 80.7 |
| **Length of nap sleep** (mins) | 67.3 | 67.0 |
| **Time spent in active sleep** (mins) | 44.3 | 41.0 |
| **Time spent in quiet sleep** (mins) | 22.7 | 26.0 |
| **Time cry** (mins) | 0 | 0 |
| **Sleep-onset latency** (mins) | 19.0 | 7.0 |
| **Sleep efficiency** (%) | 55.7 | 83.0 |
| Caregiver interaction | | |
| **Caregiver absent** (mins) | 117.3 | 0 |
| **Caregiver present only** (mins) | 0 | 95.0 |
| **Caregiver present with interaction** (mins) | 4.3 | 5.0 |

## DISCUSSION SPECIFIC TO SETH

The objective of this case study was to examine the quality of sleep of an infant who was described as being a "typical sleeper" across two settings. More specifically, this case study aimed to examine whether there were any differences or similarities between the quality of his sleep across the home and the ECEC, and whether there were any differences in caregiver behaviour at the home and the ECEC.

Seth's naps demonstrated similarities across both settings. One of the major similarities was that the amount of time spent in QS was reasonably similar across both the home and the ECEC, and that the amount of time spent in AS was also reasonably similar across both

settings. Another similarity was that the total amount of time spent sleeping during the naps was similar across the two settings.

The amount of caregiver interactions was found to be reasonably consistent across both settings, which suggested that Seth required minimal intervention when he was put down and when he woke. However, the caregiver presence differed from setting to setting, as there was always a caregiver present during the entire nap at the ECEC, while there was no caregiver presence (apart from during interaction) at home during Seth's total nap period.

Seth's total nap periods were considerably longer in the home than in the ECEC, and his sleep efficiency was higher in the ECEC than in the home. It is suggested that this is due to Seth's time spent lying/sitting or playing in his cot once he woke from his naps. Seth was observed to often do this, and he would not signal to his parents and would make minimal noise. For example, during Seth's first home nap he was observed to sit/lie in his cot, make minimal noise, and play with toys for 58 minutes after waking and the parents reported that they were not aware that this happened. Seth's mother suggested that it may be that this time in the cot is the only opportunity that Seth has to spend time on his own as he attends the ECEC five days a week, and when at home he has a five-year old sister who was reported by his parents to "always be with Seth". However, at the ECEC a teacher is always present in the room and is aware when an infant wakes and the infant is often picked up soon after.

Seth's sleep-onset latency was generally considerably longer at the home than in the ECEC, and his sleep efficiency was higher across the three observations in the ECEC than in the

three observations in the home setting. This longer sleep-onset latency at home was likely to be because Seth was generally given a bottle when he was put down for a nap at home. He was observed to play with his bottle for a period of time after finishing it, and this could not happen at the ECEC as he was not put down with a bottle here. The higher sleep efficiencies at the ECEC, suggest that Seth does not spend as much time awake in his cot at the ECEC as he does at home. The higher sleep efficiency at the ECEC is most likely due to the presence of the teacher in the sleep room as they were able to see when Seth was awake and get him up in contrast to the practice at home.

## Limitations of Case Study 3

This case study had a limitation as the home observations occurred on weekends (each Sunday for three consecutive weeks). The naps that occurred on weekends may have differed from those that occurred on weekdays, especially as Seth attended the ECEC full time however it is because of this that it was not possible to do the observations at home during the week. These findings were also limited due to the number of observations that were conducted which causes the representativeness of these findings to be uncertain.

# CHAPTER 6

# CASE STUDY 4: CHARLOTTE – REACTION TO AN EARTHQUAKE

Charlotte was a 16-month-old female who was described as being a "typical sleeper" before the earthquake, but at the time of the current study was reported to have difficulties sleeping at home but not at the ECEC. These sleep difficulties were reported to have begun after the earthquake occurred. Table 16 displays contextual information about Charlotte's sleep routines and environments. The aim of this case study was to ascertain the reported differences between the nap architecture at home and the ECEC, and to ascertain any differences between the caregiver behaviour at the home and the ECEC.

## METHOD SPECIFIC TO CHARLOTTE

### Design

This case study employed an across-settings case-study design using an ABABAB sequence where A = observations at home, and B = observations conducted at the ECEC.

### Procedure

Charlotte had one observation in each setting (the home and the ECEC) per week for three consecutive weeks. The first observation occurred just over five weeks after the occurrence of the major earthquake; however significant aftershocks were still occurring at the time of the observations.

Table 16.

*Participant information: Charlotte.*

| Name: | Charlotte |
|---|---|
| Age: | 16-months |
| Gender: | Female |
| Family composition: | Charlotte lived at home with her mother, father, and older sister (4-years-old). Two half-brothers (aged 13- and 17-years) also lived there on alternate weeks. |
| Sleep history: | Charlotte's mother reported that Charlotte never slept much during the day. Charlotte was transitioned to a cot at 3-months-old and was distressed for the first night, but settled without concern after this. |
| Home sleep environment: | Charlotte slept in a cot in a room shared with her older sister, which is darkened during naps and Charlotte sleeps on her own in the room during naps. |
| Naps at home: | Charlotte had two naps per day at home, 10.30am for an hour, and 2.30pm for an hour. Charlotte's mother reported that Charlotte would go down well, but after the earthquake Charlotte would protest when being put down. |
| Night-time sleep: | Charlotte's routine was: brushed her teeth, had a story read to her, and was then put to bed at 7pm, and woke at 5-5.30am. Charlotte was reported to wake at least once per night since the earthquake. |
| ECEC attendance: | Charlotte attended the ECEC on Tuesday, Wednesday, and Friday for full days. Charlotte was observed at home on a Wednesday, Friday, and Wednesday. |
| Naps at ECEC: | Charlotte had one nap for an hour. Charlotte's routine included being told she was going to go for a sleep, a nappy change, and then put down. |
| Development: | Charlotte's ECEC primary caregiver reported no concerns with Charlotte; however Charlotte's mother had no concerns around her development, but was concerned that bad habits around sleep were forming. |
| Reaction to earthquake: | Charlotte's mother reported that Charlotte appeared dazed at the time of the earthquake. She was more clingy and sensitive to noise afterwards. Charlotte's mother wondered if her own, anxious reaction was exacerbating Charlotte's sleep difficulties at home. |

## RESULTS SPECIFIC TO CHARLOTTE

Charlotte's data were analysed visually comparing naps across the two settings and the measurement periods. Figure 7 displays Charlotte's nap activity in both settings across the length of the naps, while the caregiver presence and interaction in both settings across the length of the naps is displayed in Figure 8. Tables 17 and 18 display Charlotte's overall nap data aggregated nap-by-nap within each setting, and Table 19 includes means across all of Charlotte's naps.

### Data Analysis

Figure 7 displays Charlotte's naps at the home and at the ECEC in chronological order. Charlotte slept during each of the naps in the home and the ECEC.

*Graphical analysis across naps*

During Nap 1 at home, Charlotte cried for a time (8 minutes) and was picked up from the cot momentarily (1 minute). Once put down again, Charlotte lay awake briefly (6 minutes) before engaging in AS for a considerable time (55 minutes). Charlotte woke and was awake momentarily (1 minute) before beginning to cry and was picked up.

Charlotte lay awake briefly (4 minutes) once put down for Nap 1 at the ECEC. Charlotte then engaged in a considerable length of AS (44 minutes) before transitioning into a period of QS (33 minutes). Charlotte reengaged in AS for a time (10 minutes) before waking and lying awake briefly (3 minutes) before she was picked up.

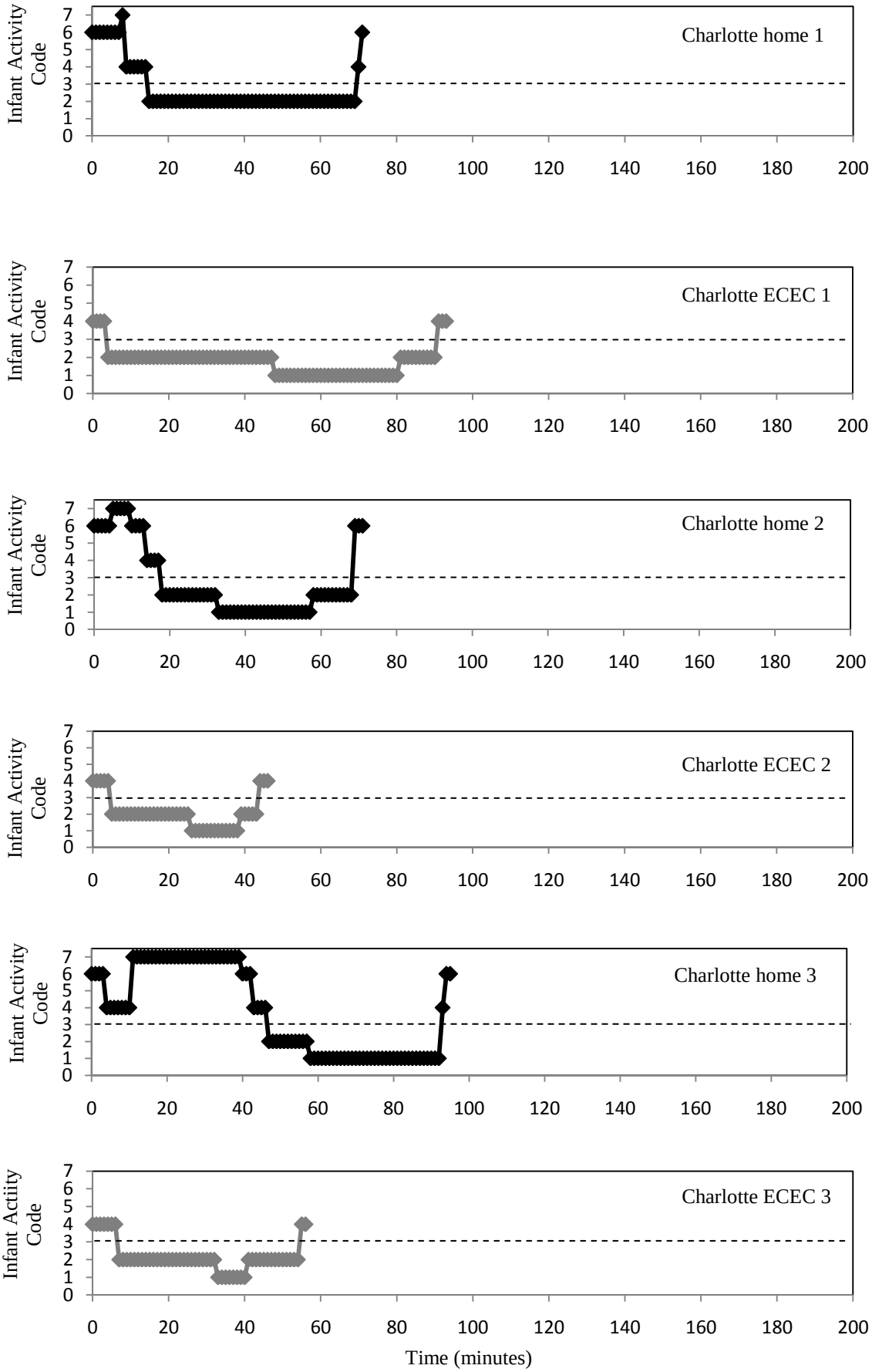


*Figure 7.* Charlotte's naps at home and the ECEC in chronological order. Dotted line denotes demarcation between sleep (1, 2) and wake (4, 6, 7) codes.

Charlotte was crying when put down for Nap 2 at home and this continued for a brief time (5 minutes) before she was picked up out of the cot for a period (5 minutes). Charlotte was crying on return to the cot and this continued for a brief time (4 minutes). Charlotte lay awake for a time (4 minutes) before engaging in a period of AS (15 minutes). Charlotte transitioned to QS for a time (25 minutes) before reengaging in AS for a period (11 minutes). Charlotte started crying as soon as she woke, and this continued briefly (3 minutes) until she was picked up.

During Nap 2 at the ECEC, Charlotte lay awake briefly (5 minutes) before engaging in AS for a period (21 minutes). Charlotte transitioned to QS for a time (13 minutes) before engaging again in AS briefly (5 minutes). Charlotte woke and lay awake momentarily (3 minutes) before she was picked up.

Charlotte cried for a brief period (4 minutes) when she was put down for Nap 3 at home. Charlotte was awake for a period (7 minutes) before she was picked up out of the cot for a time (29 minutes). On return to the cot Charlotte cried briefly (3 minutes) before lying awake for a time (4 minutes). Charlotte engaged in AS for a period (11 minutes) and then transitioned into QS for a considerable length (35 minutes). Charlotte was awake momentarily (1 minute) before she began to cry briefly (2 minutes) and was then picked up.

During Nap 3 at the ECEC, Charlotte was awake for a period (7 minutes) before engaging in AS for a time (26 minutes). Charlotte transitioned to a period of QS (8 minutes) before

engaging again in AS for a time (14 minutes). Charlotte was awake briefly (2 minutes) before she was picked up.

Figure 8 displays Charlotte's caregiver presence and interactions during each of the naps in both settings in chronological order. Charlotte slept during each nap period at the home and ECEC.

During Nap 1 at home Charlotte received a period of interaction (8 minutes) before she was momentarily taken out of the cot. Charlotte received a further period of interaction (8 minutes) followed by a brief period (2 minutes) of no interaction from the caregiver, but the caregiver remained present during this time. The caregiver then left the room for a period of time (52 minutes) before returning to interact with Charlotte and get her up (1 minute).

Charlotte received momentary interaction (2 minutes) from her caregiver after being put down for Nap 1 at the ECEC. The caregiver stopped interacting with Charlotte but remained in the room for the remainder of the nap (90 minutes). Charlotte received brief interaction as she was picked up (1 minute).

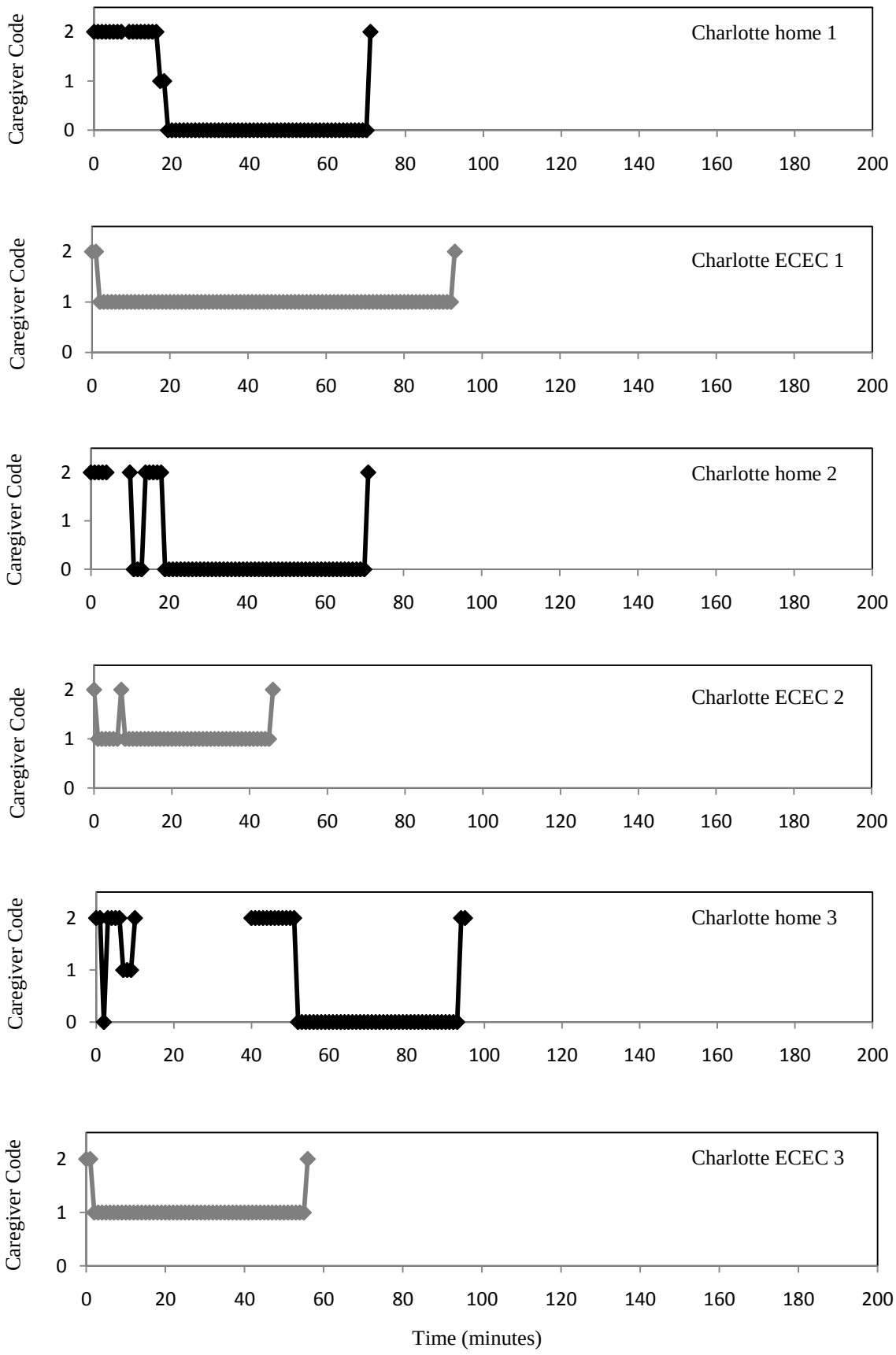


*Figure 8.* Caregiver presence and interactions during Charlotte's naps at home and the ECEC in chronological order. Note that absent data points occurred out of view of the observation.

During Nap 2 at home, Charlotte received brief interaction (5 minutes) before she was picked up for a time (5 minutes). Charlotte received momentary interaction (1 minute) followed by a brief time of no interaction but the caregiver was present (3 minutes). Charlotte received further interaction for a brief time (5 minutes) before the caregiver left the room for a period (52 minutes). The caregiver returned and interacted momentarily (1 minute) and picked Charlotte up.

Charlotte received brief interaction (1 minute) when she was put down for Nap 2 at the ECEC. The caregiver remained present without interacting for a brief period (6 minutes) before returning to momentarily interact with Charlotte (1 minute). The caregiver remained present without interaction for a period of time (45 minutes) before interacting with Charlotte (1 minute) and picked her up.

Once put down for Nap 3 at home Charlotte received brief interaction (2 minutes) before her caregiver left the room momentarily (1 minute). The caregiver returned to interact with Charlotte briefly (4 minutes) before momentarily stopping interaction but remaining present in the room (3 minutes). The caregiver briefly interacted with Charlotte (1 minute) before getting Charlotte up for a period (29 minutes). The caregiver continued interaction for a time (12 minutes) before leaving the room for a period (42 minutes). Interaction occurred momentarily (1 minute) and Charlotte was picked up.

During Nap 3 at the ECEC, Charlotte received brief interaction (2 minutes) before the caregiver stopped interacting but remained present in the room for the majority of the nap (54 minutes). Interaction occurred briefly (1 minute) and Charlotte was picked up.

*Tabular analysis across naps and across settings*

Tables 17 and 18 display specific information around sleep variables aggregated nap-by-nap in the home and the ECEC respectively.

The times that Charlotte was put down varied across the home setting, but were consistent in the ECEC. Charlotte's time that she was put down to sleep varied for each of her home naps, as she was put down at 10.18am, 11.19am, and 9.25am respectively. Charlotte was put down to nap at consistent times at the ECEC (10.12am, 10.11am, and 10.19am respectively).

Naps 1 and 2 of Charlotte's naps at home had the same total nap period (72 minutes), while Nap 3 had duration of 96 minutes. The sleep efficiencies of the first two naps at home were 56% and 51% respectively, while the sleep efficiency of Nap 3 was 48%. The total nap periods for Charlotte at the ECEC varied, as the total nap period of Nap 1 was 94 minutes, Nap 2 was 47 minutes, and Nap 3 was 57 minutes. Charlotte's sleep efficiency was reasonably consistent, although Nap 1 had higher sleep efficiency at 93%, while Naps 2 and 3 at the ECEC were 83% and 84% respectively.

Table 17.
*Charlotte's sleep variables and caregiver interaction/presence during home naps.*

| | **Nap 1 (Mon)** | **Nap 2 (Mon)** | **Nap 3 (Thur)** | **Nap 1 (Mon)** | **Nap 2 (Mon)** | **Nap 3 (Thur)** |
|---|---|---|---|---|---|---|
| Sleep Variables | | | | Sleep Variable Percentages | | |
| **Time down** | 10.18am | 11.19am | 9.25am | | | |
| **Time up** | 11.30am | 12.31pm | 11.01am | | | |
| **Total nap period** (mins) | 72 | 72 | 96 | | | |
| **Length of nap sleep** (mins) | 56 | 51 | 46 | 78% | 71% | 48% |
| **Time crying** (mins) | 8 | 12 | 9 | 11% | 17% | 9% |
| **Sleep-onset latency** (mins) | 14 | 17 | 46 | | | |
| **Time in active sleep** (mins) | 56 | 26 | 11 | 78% | 36% | 11% |
| **Time in quiet sleep** (mins) | 0 | 25 | 35 | 0% | 35% | 36% |
| **Time awake** (mins) | 15 | 16 | 21 | 21% | 22% | 2% |
| **Time out of nap location** (mins) | 1 | 5 | 29 | 1% | 7% | 30% |
| **Sleep efficiency** (%) | 78 | 71 | 48 | 78% | 71% | 50% |
| Caregiver intervention | | | | | | |
| **Caregiver absent** (mins) | 52 | 50 | 43 | 72% | 69% | 45% |
| **Caregiver present only** (mins) | 2 | 0 | 3 | 3% | 0% | 3% |
| **Caregiver present with interaction** (mins) | 18 | 17 | 21 | 25% | 24% | 22% |

Table 18.
*Charlotte's sleep variables and caregiver interaction/presence during ECEC naps.*

| | **Nap 1 (Fri)** | **Nap 2 (Wed)** | **Nap 3 (Tue)** | **Nap 1 (Fri)** | **Nap 2 (Wed)** | **Nap 3 (Tue)** |
|---|---|---|---|---|---|---|
| Sleep Variables | | | | Sleep Variable Percentages | | |
| **Time down** | 10.12am | 10.11am | 10.19am | | | |
| **Time up** | 11.46am | 10.58am | 11.16am | | | |
| **Total nap period** (mins) | 94 | 47 | 57 | | | |
| **Length of nap sleep** (mins) | 87 | 39 | 48 | 93% | 83% | 84% |
| **Time crying** (mins) | 0 | 0 | 0 | 0% | 0% | 0% |
| **Sleep-onset latency** (mins) | 3 | 4 | 6 | | | |
| **Time in active sleep** (mins) | 54 | 26 | 40 | 57% | 55% | 70% |
| **Time in quiet sleep** (mins) | 33 | 13 | 8 | 35% | 28% | 14% |
| **Time awake** (mins) | 7 | 8 | 9 | 7% | 17% | 16% |
| **Time out of nap location** (mins) | 0 | 0 | 0 | 0% | 0% | 0% |
| **Sleep efficiency** (%) | 93 | 83 | 84 | 93% | 83% | 84% |
| Caregiver intervention | | | | | | |
| **Caregiver absent** (mins) | 0 | 0 | 0 | 0% | 0% | 0% |
| **Caregiver present only** (mins) | 91 | 44 | 54 | 97% | 94% | 95% |
| **Caregiver present with interaction** (mins) | 3 | 3 | 3 | 3% | 6% | 5% |

The time that Charlotte spent crying varied across the two settings, as she did not cry during any of her naps at the ECEC but cried during each of the total nap periods at home (8 minutes, 12 minutes, and 9 minutes respectively). Charlotte's sleep-onset latency was consistent across her naps at the ECEC (3 minutes, 4 minutes, and 6 minutes), and was consistent across Naps 1 and 2 at home (14 minutes and 17 minutes) while Nap 3 at home had a sleep-onset latency of 46 minutes. Charlotte also spent time out of her cot during each home nap (1 minute, 5 minutes and 29 minutes) while she did not leave her cot during total nap periods at the ECEC.

The amount of time that Charlotte spent in sleep states varied across naps in both settings. Charlotte spent 54 minutes, 26 minutes and 40 minutes in AS in each of her respective naps at the ECEC, while she spent 56 minutes, 26 minutes, and 11 minutes in AS in each of her respective naps at home. Charlotte spent 33 minutes, 13 minutes, and 8 minutes in QS in each of her respective naps at the ECEC, while she spent 0 minutes, 25 minutes, and 35 minutes in QS in each of her respective naps at home.

Table 19 displays Charlotte's overall means across all of her naps in both the home and ECEC setting. Charlotte's total nap periods tended to be longer in the home setting than at the ECEC, however her sleep efficiency was higher at the ECEC than at the home. Charlotte spent more time in AS at the ECEC than in the home, although the amount of QS was reasonably similar across settings. Charlotte's sleep-onset latency was considerably longer at home than in the ECEC, and she spent more time crying at home than at the ECEC where she didn't cry at all. Charlotte received more caregiver interaction at home than at the ECEC.

Table 19.

*Charlotte's nap means across the home and ECEC settings.*

| | **Home naps** | **ECEC naps** |
|---|---|---|
| Sleep variables | Means | Means |
| **Total nap period** (mins) | 80.0 | 66.0 |
| **Length of nap sleep** (mins) | 51.0 | 58.0 |
| **Time spent in active sleep** (mins) | 31.0 | 40.0 |
| **Time spent in quiet sleep** (mins) | 20.0 | 18.0 |
| **Time cry** (mins) | 9.7 | 0 |
| **Sleep-onset latency** (mins) | 25.7 | 4.3 |
| **Sleep efficiency** (%) | 65.7 | 86.7 |
| Caregiver interaction | | |
| **Caregiver absent** (mins) | 48.3 | 0 |
| **Caregiver present only** (mins) | 1.7 | 95.3 |
| **Caregiver present with interaction** (mins) | 18.7 | 4.7 |

## DISCUSSION SPECIFIC TO CHARLOTTE

The aim for this case study was to ascertain the reported differences between the nap architecture at home and the ECEC, and to ascertain any differences between the caregiver behaviour at home and the ECEC.

Charlotte's naps demonstrated some consistency within the ECEC setting but varied considerably in the home setting. Charlotte's total nap period was generally higher in the home than in the ECEC, however she spent more time sleeping at the ECEC during her naps than she did at home. Charlotte spent more time crying in the home setting, while she didn't cry at all in the ECEC, and Charlotte's sleep-onset latency was considerably longer in the home setting than at the ECEC. Charlotte's sleep efficiency was also found to be generally

higher in the ECEC than in the home. These findings support the report of Charlotte having difficulty sleeping at home after the occurrence of the major earthquake, while reported as having no difficulties in the ECEC.

The caregiver interaction was considerably higher at home than at the ECEC. This indicates that Charlotte required more interaction at home and this is consistent with the reports of sleeping difficulties at home, as she often needed interaction to assist her to go to sleep at home, and this did not occur in the ECEC. Of interest here is the presence of the caregiver during the total nap period at the ECEC, while the caregiver at home was occasionally present without interaction but was more often absent when she wasn't interacting with Charlotte during the total nap periods. It is possible that the caregiver presence in the room at the ECEC provided Charlotte with a sense of security and reassurance, and is possibly why she did not engage in high levels of interaction with her caregiver.

However, Charlotte was asleep in her bedroom during the initial earthquake so it is possible that she may feel unsettled or insecure in her room by herself, as she may feel uncertain around if another earthquake will hit especially since experiencing significant, unpredictable, aftershocks. The mother reported that during the initial earthquake the parents ran into Charlotte's room like "crazed" people, and reported that in a subsequent after-shock she sat with her daughters in a doorway for approximately twenty minutes. It is possible that Charlotte's mother may have had a high level of expressed anxiety around the earthquake and she may have been more reactive to Charlotte.

## Limitations of Case Study 4

A limitation of this case study was that observations were not done on consistent days in either of the two settings due to scheduling or sickness. It would have been better if the observations for each setting were done on the same day each week, as it would have attempted to control variables that may influence sleep and occur on different days e.g. swimming lessons.

# CHAPTER 7

# RESULTS ACROSS PARTICIPANTS

The means of each of the participants' sleep variables were used to give an overall mean for each sleep variable across settings.

## Data Analysis

Table 20 displays the overall mean (standard deviation) and ranges for each sleep variable across the home and the ECEC. Overall, total nap periods and length of nap sleep tended to be longer in the home setting that in the ECEC. More time was spent in AS in the home setting than the ECEC; however the average time spent in QS was reasonably consistent across the two settings. Both the time spent crying and the sleep-onset delay tended to be longer in the home environment than in the ECEC. The ECEC had higher average sleep efficiency than in the home setting.

The levels of caregiver interaction were considerably higher in the home than in the ECEC. The caregiver presence without interaction was also considerably higher in the ECEC than in the home while the caregiver absence was higher in the home setting than in the ECEC.

Table 20.

*Means (standard deviations) across the participants' home and ECEC settings.*

| | **Home naps** | | **ECEC naps** | |
|---|---|---|---|---|
| Sleep variables | Means | Ranges | Means | Ranges |
| **Total nap period** (mins) | 120.5 (29.02) | 80 - 162 | 87.9 (24.34) | 66 - 129 |
| **Length of nap sleep** (mins) | 84.0 (33.39) | 51 – 139.3 | 75.4 (23.26) | 58 – 115.3 |
| **Time spent in active sleep** (mins) | 60.0 (24.99) | 31 – 96.7 | 53.1 (22.34) | 39.7 - 91.7 |
| **Time spent in quiet sleep** (mins) | 23.8 (11.93) | 9.8 – 42.7 | 23.1 (3.06) | 18 - 26 |
| **Time cry** (mins) | 4.4 (4.05) | 0 - 9.7 | 2.3 (4.03) | 0 – 9.3 |
| **Sleep-onset latency** (mins) | 16.5 (7.47) | 5 - 25.7 | 6.5 (2.52) | 4.3 – 7.3 |
| **Sleep efficiency** (%) | 66.9 (6.83) | 55.7 – 85.7 | 83.7 (5.12) | 75.7 – 89.3 |
| Caregiver interaction | | | | |
| **Caregiver absent** (mins) | 100.8 (41.7) | 48.3 – 159.3 | 0 (0) | 0 |
| **Caregiver present only** (mins) | 0.6 (0.70) | 0 – 1.7 | 87.0 (14.72) | 61.7 – 96.7 |
| **Caregiver present with interaction** (mins) | 14.9 (12.58) | 2.7 – 33.8 | 6.8 (4.23) | 3.3 - 14 |

# CHAPTER 8

# DISCUSSION

The nap architecture of each of the infants varied to differing extents within each of the observed settings. Sophie's nap architecture was found to vary across the two settings during her transition to the ECEC. However, it was found that once settled at the ECEC her naps across settings shared similarities, particularly with similar time spent in QS and AS, sleep-onset latency, and sleep efficiency. The naps of Charlie and Seth demonstrated some consistencies within both settings, and it is possible that their observed naps may be the closest to the typical naps of infants, as these infants were described as "typical sleepers" who were settled in the ECEC. Charlotte's naps at the ECEC were reasonably consistent and unremarkable; however her naps at home varied which supported the report of Charlotte having difficulties sleeping at home after the occurrence of a major earthquake. It was expected that the naps of Sophie and Charlotte both demonstrated varied naps due to the differing circumstances in which they were observed.

## *Nap architecture*

The total nap periods were found to generally be considerably longer in the home period than in the ECEC and sleep efficiency was also found to generally be higher in the ECEC than in the home setting. It is possible that this was due to the presence of caregivers in the sleep room at the ECEC at all times. This presence meant that the caregivers were able to respond to any noise or movement immediately, as infants were often picked up out of the cot not long after they had woken from their naps. This differed from in the home period where the infants were picked up only after they starting crying, or making other noise, or if the

parents checked the room and saw that the infants were awake. Both Charlie and Seth appeared content to spend considerable amounts of time in their cots sitting or lying, or playing with their toys, while making minimal noise. Charlotte and Sophie differed from this as they often cried soon after they woke from their naps at both the home and the ECEC. These are observations which have not been made previously in the literature so explanations are difficult to formulate. It is possible that Charlie and Seth had different temperaments from the other two infants. It is also possible that the infants had differing experiences of response to signalling on awakening or it is possible that Charlotte and Sophie cried more readily because they had more sleep disturbance than the other two infants.

The participants in this study were found to generally engage in more AS than QS during their naps. This contrasted with the findings of Torok (2009) who found that the participants in that study engaged in more QS than AS, however the current study was looking at infants who were described as "typical sleepers" while Torok (2009) looked at infants who were described as having sleep difficulties.

The observed range of nap architecture in this study highlights the complexity of sleep in infants. There are a number of developmental tasks that are mastered at different stages of sleep development (Sadeh et al., 2007) and it is possible that each of the infants in the current study may be at different developmental stages and this may further contribute to some of the variation within nap architecture.

*Caregiver presence and interaction*

The caregiver presence and interaction differed between the settings. The biggest difference between the home and the ECEC was the presence of caregiver in the sleep environment of the infants.

As noted previously, a caregiver was present for the entire length of each of the infants' naps at the ECEC, while the length of time that a caregiver was present without interaction in the home environment was minimal. This finding contrasted with that of Torok (2009) who found that caregivers in both the home and the ECEC setting were absent during the majority of the nap. The finding in the current study was due to the ECEC following a policy requiring that a teacher is present at all times when an infant is down for a nap.

## Limitations of the current study

The current study had a number of limitations, although a number of these were due to the occurrence of the major earthquake and subsequent aftershocks, scope of the research, and delays in getting approval to enter into the ECEC. Each case study had its own limitations and these are discussed in respective chapters (Chapters 3 – 6).

The small sample size was a limitation to the study. The number of infants used in this study was due to time constraints and delays. However this study is useful as it provides some data on the naps of typically developing infants across the home and ECEC settings, and gives some direction for future research.

Following on from this, it would have been better if all infants could have had observations on consistent days, particularly either all observations conducted on weekdays or all observations conducted on weekends, as the context of the family activities is likely to be different between the two phases of the week. However, due to scheduling, infant sickness and time constraints, this was not always possible during the data collection for this study. A particular difficulty around this was ECEC attendance, as an infant attending full-time ECE would be unavailable for weekday home observations.

During the coding of the observations, the caregiver cannot always be seen as they are occasionally behind the camera. The coders had to assume, such as from the noise of footsteps leaving the room, when the caregiver was present or not. However, this information was important to gather but this was a limitation within the study.

### Implications of the current study for research

Naps in infants as they transition into ECECs would be a good area to examine further as it would allow a comprehensive look at the change in sleep patterns, and analyse if any trends occur over the transition period. To achieve this, more sampling than has been done in the current study would need to be conducted to ensure a good representation of sleep at home before the transition begins. This would be beneficial, and was what the original study intended to look at. Case Study 1 suggested that transitioning infant's naps begin to settle once the infant is settled at the ECEC, and it would be beneficial to conduct a longitudinal group study over the transition and attendance at ECEC to see if the sleeping patterns continue to appear settled over a period of time.

The participants in this study varied from three to five days of attendance at the ECEC per week. This suggests that another area that would be of interest to conduct research into would be the attendance at ECECs and whether this impacts on the quality of sleep an infant has across these settings. The current study did not compare this, but considers that it may contribute to the quality of sleep in each setting.

In some cases, observations had to occur on weekends while observations at the ECEC occurred on weekdays. A future area of research may be to examine whether there is a difference between weekday naps and weekend naps as it is possible that naps differ on weekends than on weekdays, particularly with infants who are attending ECECs full time.

The caregiver interactions between the ECEC and the home were found to differ in that a caregiver was always present during an infant's nap in the ECEC. This was different from the home setting where it was found that the caregiver was never present for the entire nap. It would be interesting to further examine how caregiver presence impacts on the quality of infants' naps.

Also, the environment at the ECEC was clearly fit for the purpose of functioning as a sleeping area, as it had a separate sleep room away from play areas, and this room was darkened, well-ventilated, and always staffed by a qualified teacher when an infant was sleeping. Once a thorough account of naps at one ECEC, and the effects of transitions between home and ECEC were obtained in a particular case, it would be interesting to conduct further research by looking at ECECs which approach infant sleep differently. This

may involve ECECs where staff put all infants down at the same time, or where there was no established sleep room.

## Implications of the current study for practice

As addressed in the literature review, there are a number of factors that contribute to the sleep of an infant, with a major contributor being the sleep environment. This study demonstrated both differences and similarities across environmental settings, and indicated a number of implications for practice.

The findings of variability in infant sleep patterns across both settings during the transition phase indicated that the transition to the ECEC may act as a stressor for infants beginning to attend an ECEC. An important implication of this is that professionals need to be aware of this, and provide additional support to the infant so that they are able to feel supported in unfamiliar settings with differing caregivers. Communication with the parents so both parties understand how the infant is responding in respective settings would further support the infant during this unsettling period.

Consistencies across the two settings in infants described as “typical sleepers” who were settled at the ECEC indicated that it is possible for such infants to maintain similar sleep in both settings. This may have been because of the quality of the ECEC environment. The ECEC that was used for these observations had a high-quality sleep environment, as it was away from play areas, was well-ventilated and darkened. It is important for professionals to

set up sleeping areas so that infants are able to sleep with minimal noise and distractions, as also suggested by Siren-Tiusanen and Robinson (2001).

The findings also suggested that once infants are settled at the ECEC, it may be a stabilising environment when there is additional uncertainty or disrupting factors occurring outside of the ECEC, such as the occurrence of the first and major earthquake. Interestingly the number of aftershocks made it inevitable that Charlotte would have experienced earthquakes in both settings yet her sleep at the ECEC remained stable. This may have been because of the calm and regular routine used at the ECEC and the presence of the caregiver during the sleep times. Teasing out these factors was not possible in this study but caregivers may have a role in such situations whereby they can guide and reassure parents in such situations.

## Conclusion

Findings from each of the individual case studies have been analysed and discussed in Chapters 3 – 6. The overall findings from the current study indicate that the nap architecture of the infants was individually varied across the two settings, and this was due to variation of participant factors. However, the findings suggest that infants tend to have longer total nap periods at home than at ECECs, and that the sleep efficiency is higher in ECECs. These findings need to be interpreted with some caution however, due to the variation within participant factors.

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# APPENDIX A – Information Sheets

UNIVERSITY OF CANTERBURY
*Te Whare Wānanga o Waitaha*
CHRISTCHURCH NEW ZEALAND

**Information Sheet for Parents**

**Child and Family Psychology**
**SLEEP STUDY**

August 2010

Dear Parents/Caregivers,

My name is Shirley Stuart and I am a student in the Child and Family Psychology programme at the University of Canterbury. As part of my studies, I am required to complete a dissertation, which involves carrying out research in a specific are over a 12-month period. For my dissertation, I have chosen to study sleep in young children as they transition to attend early childhood education centres. I will study children aged between 6 and 24 months who are described by their parents as being settled sleepers and who do not co-sleep with parents.
If this describes your child, you are invited to participate in this sleep study. The project will include:

- A short interview with you regarding your child's sleep at home
- A short interview with your child's early childhood education teacher/s regarding their sleep routines at the centre.
- Direct observations of your child sleeping (napping) at home
- Direct observations of your child sleeping (napping) in the early childhood education centre.

The aim of this research is study the quality of children's sleep, in the early childhood education centre and at home, as they transition to early childhood education. In order to do this a range of information will need to be gathered. This includes interviewing you as well at the early childhood education teacher/s regarding your child's sleep behaviour. Such questions that will be asked include: a brief history of your child's sleep, usual length and number of naps per day, and child's behaviour before and after their nap. The teacher/s will be asked questions such as the child's behaviour before and after sleep at the early childhood education centre.

Please note that any complaints can be directed to Dr Mike Grimshaw at
michael.grimshaw@canterbury.ac.nz

You will also be asked to fill out a simple sleep diary on three separate occasions, which will include information about your child and their sleep routines.

In order to study the quality of children's sleep we will be using some well established methods and technology. These may vary between home and the early childhood education centre, depending on the sleeping arrangements. Methods I will choose from are:

- I might sit and watch your child sleeping and code any movements they make (we can determine sleep state from this).
- I might video your child sleeping using a small web-cam or a camera on a tripod. In this case we may need an invisible infra-red light source, which is well established in sleep research.
- I will also be describing the sleep environment, and take measures of ambient light and noise.

It is envisioned that each observation will be approximately 2-4 hours observing your child at home depending on the length and predictability of their sleep. It is also envisioned that it will take approximately the same number of hours, in order to observe your child in their early childhood education centre, depending on the length of their sleep. Observations will occur once a week, with the number of weeks randomly assigned in order to strengthen the research design. This will be discussed with you when we meet. These weeks will occur over a longer period of time, as the final week will occur once you and your child's teachers agree that he/she is settled at the early childhood centre. An additional observation each week of recording is desirable, but will be optional for you.

All information will be kept confidential to myself and my research supervisors. The resulting report will not contain any identifying details. No images will be used in the resulting report. The results of the research may be published, but you may be assured of the complete confidentiality of the data gathered. This research is being completed in partial fulfilment of an Med (ChFamPsyc) so the dissertation will become publically available from the University of Canterbury library.

Participants will be provided with a summary once the report has been completed.

Should you and your child decide to participate in this study, you have the right to withdraw at any time without having to give a reason. If you withdraw you may also withdraw any information you have provided about yourself or your child.

There are no known risks to these evaluations. All information that is collected will be done with great care for your child and will not cause them any upset.

Thank you for taking time to consider my request. It you want to know more about this study (either now or at a later date), please feel free to contact either myself or my supervisors.
We are committed to treating all participants in a fair and ethical manner. This project has been reviewed and approved by the University of Canterbury Human Ethics Committee.
Please feel free to contact me.
Kind regards,

Shirley Stuart
Phone: 027 279 6636

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UNIVERSITY OF CANTERBURY
*Te Whare Wānanga o Waitaha*
CHRISTCHURCH NEW ZEALAND

**Information Sheet for Early Childhood Education Centres**

**Child and Family Psychology**

**SLEEP STUDY**

August 2010

My name is Shirley Stuart and I am a Child and Family Psychology student at the University of Canterbury. I am beginning my dissertation, which involves conducting research in a specific area over a 12-month period. I am planning on doing my dissertation on the quality of sleep in young children as they transition to an early childhood education setting. I will study children aged between 6 and 24 months who are about to begin early childhood education. This study will include:

- A short interview with the parent/s or caregiver/s regarding the child's sleep at home.
- A short interview with the child's early childhood education teacher/s regarding the child's sleep at the early childhood education centre.
- Direct observation/video recording of the child sleeping during the day (napping) at home before they begin early childhood education; again once the child begins attending early childhood education; and again once the child is settled at the early childhood education centre.
- Direct observation/video recording of the child sleeping during the day (napping) at the early childhood education centre when they first start attending the centre; and again once they are described as being settled in the centre.

I am looking into sleep over the transition period for children who are under the age of 24 months and are just beginning to attend an early childhood education centre. I am interested in looking at the children's nap patterns at both home and in the early childhood education centre. The child will be under observation for a randomly assigned length range in the home setting, will be negotiated

with the parent/s or caregiver/s. Observations in the early childhood education centre will occur over 3 weeks with 3 observations per week.

To investigate the quality of children's sleep I will be using some well established methods and technology. I will video each of the sleeping (nap) sessions that will be observed. This will be done using either a small web cam attached to the child's cot, or a video camera on a tripod. The location of the camera will be negotiated with the parent/s and staff and decided with safety the main consideration. The video recordings will provide the data for the study. They record sleep states directly and unobtrusively without additional light.

What is expected of the early childhood education centre:

- Advise parents of the study.
- The staff, with permission of the parent/s or caregiver/s, will note sleep-related behaviours, routines, and with consent of the teacher, will answer questions about the sleep-related behaviours of the child.
- Provide access for myself to record the sleep of participating infants. The manner in which this may occur will be negotiated fully with you prior to any of the children in your centre being recruited.

The participant requirements are:

- Children aged between 6 and 24 months and beginning their first experience of early childhood education.
- Children with settled sleep at home and who do not co-sleep with a parent or caregiver.

The number of observations per participant will be mutually agreed upon at the beginning of the research, but will be fewer than 6 observations in each setting. All information will be kept confidential to my supervisors and myself. The resulting dissertation will not include any information identifying any of the participants, centres or the staff. The report may be published, however you can be assured that the data that will be gathered will be kept completely confidential. No images will be used in the resulting report. This research is being completed in partial fulfilment of an MEd (ChFamPsyc) so the dissertation will become publically available from the University of Canterbury library. Participating centres will receive a summary of the findings once the dissertation has been completed.

Please note that any complaints can be directed to Dr Mike Grimshaw at
michael.grimshaw@canterbury.ac.nz
**University of Canterbury** Private Bag 4800, Christchurch 8140, New Zealand. **www.canterbury.ac.nz**

There are no known risks to these evaluations. All information that is collected will be done with great care for the children and will not cause them any upset. We are committed to treating all participants in a fair and ethical manner. To do this, this project has been approved by the University of Canterbury Ethics Committee which ensures that this research is done ethically and follows their guidelines.

If you have any questions, please do not hesitate to contact me.
Kind regards,

Shirley Stuart
Cell phone: 027 279 6636

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UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

**Information Sheet for Early Childhood Education Centre Teachers**

**Child and Family Psychology**

**SLEEP STUDY**

August 2010

My name is Shirley Stuart and I am a fifth year Child and Family Psychology student at the University of Canterbury. I am beginning my dissertation, which involves conducting research in a specific area over a 12-month period. I am planning on doing my dissertation on the quality of sleep in young children as they transition to an early childhood education setting. I will study children aged between 6 and 24 months who are about to begin early childhood education.

I am looking into sleep over the transition period for children who are under the age of 24 months and are just beginning to attend an early childhood education centre. I am interested in looking at the children's nap patterns at both home and in the early childhood education centre. The child will be under observation for a randomly assigned length range in the home setting, will be negotiated with the parent/s or caregiver/s. Observations in the early childhood education centre will occur over 3 weeks with 1-3 observations per week.

What is expected of the early childhood teacher:

- A short interview with the child's early childhood education teacher/s regarding the child's sleep at the early childhood education centre.
- Answer questions regarding the routines/behaviours of the participating child at the early childhood education centre.

All information will be kept confidential to my supervisors and myself. The resulting dissertation will not include any information identifying any of the participants, centres or the staff. The report may be published, however you can be assured that the data that will be gathered will be kept

completely confidential. No images will be used in the resulting report. This research is being completed in partial fulfilment of an Med (ChFamPsyc) so the dissertation will become publically available from the University of Canterbury library. By participating, you will receive a summary of the findings once the dissertation has been completed.

There are no known risks to these evaluations. All information that is collected will be done with great care for the children and will not cause them any upset. We are committed to treating all participants in a fair and ethical manner. To do this, this project has been approved by the University of Canterbury Ethics Committee which ensures that this research is done ethically and follows their guidelines.

If you have any questions, please do not hesitate to contact me.
Kind regards,

Shirley Stuart
Cell phone: 027 279 6636

My supervisors' details:

Dr Karyn G. France
Registered Clinical Psychologist
Coordinator Child and Family Psychology Programme
University of Canterbury
Private Bag 4800
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New Zealand
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Please note that any complaints can be directed to Dr Mike Grimshaw at michael.grimshaw@canterbury.ac.nz

# APPENDIX B – Consent Forms

UNIVERSITY OF CANTERBURY
*Te Whare Wānanga o Waitaha*
CHRISTCHURCH NEW ZEALAND

**Consent Form for Parents**

**Child and Family Psychology**
**SLEEP STUDY**

- I have read and understood the attached information sheet, and I have been given an opportunity to ask the researcher questions. I understand what is involved for my child, myself, and the early childhood education centre.

- I understand that all information will be confidential and the written report will not contain any identifying details. Identifying information will only be available to the participant, the University supervisors and myself.

- I agree and consent to myself and my child taking part in the sleep study described in the attached information sheet.

- I consent to the researcher obtaining information from my child's early childhood education centre teacher/s relating to my child's sleep behaviour at early childhood education centre, as described in the attached information sheet.

- I understand that the resulting dissertation may be published, and will be publically available from the University of Canterbury library.

- I understand that I will not be responsible for any of the equipment, and that the researcher will take care of all the equipment.

- I understand that my child and I can withdraw from this study at any time without affecting the way I am treated and without having to give a reason.

- I note that this project has been reviewed and approved by the University of Canterbury Human Ethics Committee.

- I_____(please print name) agree to participate in the sleep study described in the attached information sheet.

Signature _____.

Date _____.

Please note that any complaints can be directed to Dr Mike Grimshaw at
michael.grimshaw@canterbury.ac.nz

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

**Early Childhood Education Centre**
**Director Consent Form**

**Child and Family Psychology**
**SLEEP STUDY**

- I have read and understood the attached information sheet, and I have been given an opportunity to ask the researcher questions. I understand what is involved for the participants and the early childhood education centre.
- I understand that all information will be confidential and the written report will not contain any identifying details.
- I agree and consent to _____(please print name of early childhood education centre) taking part in the sleep study described in the attached information sheet.
- I understand that I will not be responsible for any of the equipment, and that the researcher will take care of all of the equipment.
- I understand that the resulting dissertation may be published, and will be publically available from the University of Canterbury library.
- I note that this project has been reviewed and approved by the University of Canterbury Human Ethics Committee.
- I understand that _____(please print name of early childhood education centre) may withdraw at any time without affecting the way the early childhood education centre is treated and without giving a reason.

- I _____(please print name) agree for

- _____(please print name of early child education centre) to take part in the sleep study described in the attached information sheet.

Signature _____.

Date _____.

Please note that any complaints can be directed to Dr Mike Grimshaw at
michael.grimshaw@canterbury.ac.nz

UNIVERSITY OF CANTERBURY
*Te Whare Wānanga o Waitaha*
CHRISTCHURCH NEW ZEALAND

**Consent Form for Early Childhood Education Centre Teacher**

**Child and Family Psychology**
**SLEEP STUDY**

- I have read and understood the attached information sheet, and I have been given an opportunity to ask the researcher questions. I understand what is involved for the participating children and the early childhood education centre.
- I understand that all information will be confidential and the written report will not contain any identifying details.
- I _____ agree and consent to taking part in the sleep study described in the attached information sheet.
- I understand that I will not be responsible for any of the equipment, and that the researcher will take care of all of the equipment.
- I understand that both the Early Childhood Education Centre and the participating child's parents' have consented to me providing information about the child.
- I understand that the resulting dissertation may be published, and will be publically available from the University of Canterbury library.
- I note that this project has been reviewed and approved by the University of Canterbury Human Ethics Committee.
- I understand that I _____may withdraw at any time without affecting the way the early childhood education centre is treated and without giving a reason..

- I _____(please print name) to take part in the sleep study described in the attached information sheet.

Signature _____.

Date _____.

Please note that any complaints can be directed to Dr Mike Grimshaw at
michael.grimshaw@canterbury.ac.nz

## APPENDIX C – Ethics Approval

Human Ethics Committee
Tel: +64 3 364 2241, Fax: +64 3 364 2856, Email: human-ethics@canterbury.ac.nz

UNIVERSITY OF CANTERBURY
*Te Whare Wānanga o Waitaha*
CHRISTCHURCH NEW ZEALAND

Ref: HEC 2010/66

28 June 2010

Shirley Stuart
Health Sciences Centre
UNIVERSITY OF CANTERBURY

Dear Shirley

The Human Ethics Committee advises that your research proposal "Quality of naps in young children during transition to early childhood education centres" has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 23 June 2010.

Best wishes for your project.

Yours sincerely

pp MCGrimshaw

Dr Michael Grimshaw
***Chair, Human Ethics Committee***